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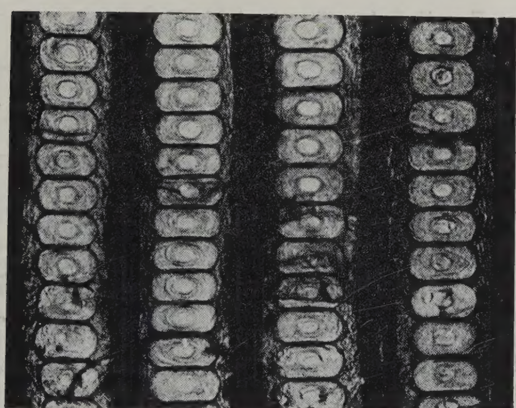

日本古生物学会

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All Communications relating to this Journal should be addressed to the
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Geological Institute, Faculty of Science, University of Tokyo, Japan

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414. NOTE ON *STEINMANNELLA* (*YEHARELLA*) *AINUANA* (YABE AND NAGAO)*

MITSUO NAKANO

Institute of Geology and Mineralogy, Faculty of Science, Hiroshima University

Steinmannella (*Yeharella*) *ainuana* (YABE and NAGAO) について：北海道三笠市幾春別産の多数の標本について古生物学的研究を行った。その結果，この種は成長過程における変化，および個体変異の著しいことが判明したので報告する。 中 野 光 雄

Introduction and Acknowledgement

Steinmannella CRICKMAY, approximate to STEINMANN's Pseudoquadratae section, inhabited in the Indo-Pacific region from Upper Jurassic to Upper Cretaceous. It was synonymized with *Yaadia* CRICKMAY by COX (1952) and with *Transitrigonia* DIETRICH by SAVELIEV (1958), but KOBAYASHI and AMANO (1955) accepted its validity and divided into 3 subgenera, i. e. *Steinmannella* s. s., *Yeharella* KOBAYASHI and AMANO, and *Setotrigonia* KOBAYASHI and AMANO. *Steinmannella* (*Yeharella*) is well characterized by its outline and surface costation, and characteristic in the Northern Pacific region possibly from upper Albian to Maestrichtian. *Trigonia ainuana* is a typical *Steinmannella* (*Yeharella*), and has been originally described by YABE and NAGAO (1928) from the "*Trigonia* Sandstone" (Cenomanian-Turonian) of Pombetsu in Ikushumbetsu, Mikasa-city, Central Hokkaido. Recently, the writer had an opportunity to study the Cretaceous rocks of the Ikushumbetsu district and collected numerous specimens of *Steinmannella* (*Yeharella*) *ainuana* from various places. As a result, it is recognized that *St.* (*Y.*) *ainuana* represents a remarkable change of characters in ontogeny and this species shows a certain degree of variation.

The materials dealt here with were collected by T. MATSUMOTO and the writer from the Ikushumbetsu district, Central Hokkaido and stored in the Geological Institute of Kyushu (GK) and Hiroshima (GH) Universities.

The writer wishes to express his sincere thanks to Prof. Sotoji IMAMURA of Hiroshima University. His thanks are due to Prof. Teiichi KOBAYASHI of the University of Tokyo, Prof. Tatsuro MATSUMOTO and Mr. Ikuwo OBATA of Kyushu University, Messrs Tomowo OSE and Ichiro HAYASHI of the Sumitomo Colliery Company, and Emer. Prof. Shoshiro HANZAWA of Tohoku University for their assistances.

Family **Trigoniidae** LAMARCK, 1819

Subfamily Quadratotrigoniinae SAVELIEV, 1958

Genus *Steinmannella* CRICKMAY, 1930

* Received Jan. 31, 1961; read at 78th meeting of the Society at Akita, May 13, 1961.

Type species:—Trigonia holubi KITCHIN, 1913. Up. Neocomian; Natal, South Africa.

Synonym: — Transitrigonia DIETRICH, 1933.

Remarks:—The writer here accepts KOBAYASHI and AMANO's proposal. This genus varies to a large extent in surface sculpture and shell form, and comprises 3 subgenera and a number of species and varieties as listed by them (1955) and NAKANO (1960). *Trigonia maloneana* STOYANOW from the Albian formations of Arizona and Texas belongs probably to *Steinmannella* s. s.

Subgenus *Yeharella* KOBAYASHI and AMANO, 1955

Type species:—Trigonia japonica YEHARA, 1923. Campanian; Sanuki and Iyo, Japan.

Diagnosis:—Shell large in size, subquadrate to triangularly ovate; umbo improminent; beak opisthogyrous and pointed anteriorly; escutcheon depressed, with transverse costellae which are effaced later; area ornamented with tuberculate costellae at least near umbo but in the later stage costellae become obsolete; carinae absent but sometimes a row of nodes aligned in place of three carinae in the vicinity of umbo; median furrow shallow and rather indistinct, separates a broad anteal part from a narrow posteal; flank with tuberculate costae or rows of nodes which are disposed subconcentrically or diagonally.

Test thick; growth-lines somewhat distinct on the whole surface.

Remarks:—As pointed out already by KOBAYASHI and AMANO, this subgenus is easily distinguishable from the others of *Steinmannella* by the effacement of the transverse costellae and the carinae on the area. The specific list of the subgenus was given by them (1955) and NAKANO (1960).

The shell belonging to this subgenus shows a remarkable morphic change through growth.

The immature shell of this subgenus is subcircular to ovate in outline and quite similar to that of *Myophorella* s. s. in surface costation. The beak is anteromesial to subcentral. Its area is provided with transverse to oblique costae, and distinctly bordered by three rows of nodes. Median furrow is shallow but distinct. Costae on the flank are tuberculate or broken into rows of nodes.

In the later stages, the shell becomes gradually trigonally ovate or subquadrate in shape and the beak is shifted anteally. The carinae and sculpture on the area are obsolete, and the median furrow is generally indistinct. The flank is ornamented with numerous tuberculate costae or rows of nodes which are disposed subconcentrically or diagonally.

Growth-lines are somewhat distinct on the whole surface through growth, especially in the posterior part of the later stages. Internally, weak radial plications run along the positions of the carinae and ventral margin is smooth. As pointed out by KOBAYASHI and AMANO (1955, p. 200), in some internal moulds of the right valve (pl. 20, figs. 3 and 5) it is also well observed that several grooves and ridges behind the posterior adductor scar and they are oblique to the margin.

The shell outline and the surface costation are fairly variable in this subgenus. The outline is subquadrate in *ainuana, kimurai* and others, but subtrigonal in *fitchi, japonica* and its variety *obsoleta* etc. *Leana* has a subcircular shell, but some forms of *ainuana* are somewhat trapezoidal. Costae on the flank are

arranged subconcentrically in *japonica* and its ally, while they are diagonal in common forms. Costation on the area and escutcheon are indistinct in most others, but the sculpture is fairly distinct in some forms (pl. 21, fig. 4) of *ainuana*. Nodose carinae developed in *japonica* and *kimurai* etc., while they are obscure in most common forms. A median furrow is often distinct, but indistinct in common forms. PACKARD's *leana* (pl. 5, figs. 1 and 5) has a wide area, almost as large as the flank, but in most others it is nearly as wide as a third of the flank.

Distribution:—Upper Albian (?) to Maestrichtian in the Northern Pacific region. As already discussed by the writer (1958), in Japan this subgenus appeared probably in the Cenomanian of the Yezo geosynclinal region including Hokkaido and Sachalin district, and flourished mainly in the Upper Cretaceous of Southwest Japan.

Steinmannella (Yeharella) ainuana (YABE and NAGAO)

Pl. 20, Figs. 1-6; Pl. 21, Figs. 1-6.

1928. *Trigonia ainuana* YABE and NAGAO, *Sci. Rep. Tohoku Imp. Univ., 2nd Ser., Vol. 9, No. 3*, p. 84, pl. 16, figs. 20, 20a.
1955. *Steinmannella (Yeharella) ainuana* KOBAYASHI and AMANO, *Japan. Jour. Geol. Geogr., Vol. 27, Nos. 3-4*, p. 204.
1957. *Trigonia* cfr. *ainuana* IKEGAMI and OMORI, *Jour. Hokkaido Gakugei Univ., Sect. B, Vol. 8, No. 1*, pl. 3, figs. 1a-c.

Material:—Holotype (YABE and NAGAO's original specimen) from Pombetsu in Ikushumbetsu, Mikasa-city, Central Hokkaido. The fairly well preserved specimens which the writer has examined are as follows:

In M. NAKANO's collection, from M. NAKANO's horizon U_5 (see 1960, p. 223, tab. 1) of the *Inoceramus hobetsensis* zone in the upper "*Trigonia* Sandstone" at an old site of a quarry near the Katsurazawa-dam in Ikushumbetsu, Mikasa-city (GH. NM. 1081-1095, 1097 and 1099). GH. NM. 1096 and 1098 were collected from M. NAKANO's L_2 horizon (see 1960, p. 224, tab. 2) of the *Calycoceras* zone (?) in the lower "*Trigonia* Sandstone" along the Pombetsu river in Ikushumbetsu, Mikasa-city.

In T. MATSUMOTO's collection, GK. H. 6046, 6047 and 6053a-b were collected from the upper "*Trigonia* Sandstone" at T. MATSUMOTO's loc. IK-2015 along the Pombetsu river in Ikushumbetsu, Mikasa-city and GK. H. 6054 was collected by K. SATO from the *Inoceramus hobetsensis* zone of the upper "*Trigonia* Sandstone" at the point (F) of 138.60 m. in No. 1 tunnel of the Katsurazawa-dam in Ikushumbetsu. Besides them the writer observed numerous unregistered materials from the same locality, collected by T. MATSUMOTO.

Description:—Shell large in size, ovately subtrapezoidal to trigonally ovate, inequilateral, broader than high and gently convex from umbo to venter and from anterior to posterior but obtuse carinal angulation developed in the boundary between the flank and the area; antero-dorsal margin short and nearly straight or slightly convex, forming an angle of 95 to 115 degrees against with postero-dorsal margin; antero-ventral rounded and transmitting gradually into broadly arched ventral; postero-dorsal nearly straight or a little convex, about a half as long as shell; siphonal margin gently curved and well rounded but sometimes subangulated at junction with dorsal or ventral margin. Umbo low and rather improminent; beak opisthogyrous and pointed at about a fifth

to three-tenths from the front. Flank with about 17 nodose costae or rows of nodes which are subvertical near the area and become thicker towards ventral periphery where nodes are somewhat elongated along growth-lines; umbonal about 2 tuberculate costae concentric to subconcentric; succeeding some 10 nodose costae or rows of nodes more or less broadly spaced and curved diagonally; last 5 or so rows of nodes, slightly currved, oblique forward and arranged diagonally. Carinae obscure, but in the early stage a row of nodes aligned in place of the carinae. Area smooth except for the umbonal region with numerous tuberculate costae, almost as large as a third of the flank and distinguishable from the flank by an abrupt change of curvature and absence of nodes. Median furrow well observed in the vicinity of umbo where the area is divided into a broader anteal and a narrower posteal part by it, but in the later stage it becomes obscure. Escutcheon narrow, somewhat depressed, provided with numerous slightly tuberculate costellae which are evanescent later.

Growth-lines somewhat distinct on whole surface, especially in posterior. Internally, weak radial plications run along the positions of carinae and very thickened at the ventral periphery; ventral margin smooth. Test thick and its thickness measures about 5 mm. in common adult forms.

Measurements in mm.

Specimen	Valve	Length	Height	L/H
GH. NM. 1081	Right	76. 0	68. 0	1. 12
GH. NM. 1082	Right	74. 2	65. 2	1. 14
GH. NM. 1084	Right (internal)	58. 3	48. 0	1. 21
GH. NM. 1085	Left (internal)	65. 4	57. 2	1. 14
GH. NM. 1093	Left (internal)	74. 5	64. 8	1. 15
GH. NM. 1094	Right	72. 1	62. 9	1. 14
GH. NM. 1099	Left	62. 5	55. 5	1. 12
GK. H. 6054	Bivalved	83. 4	68. 0	1. 23

Explanation of Plate 20

(All natural size)

Steinmannella (*Yeharella*) *ainuana* (YABE and NAGAO) ....p. 141

Figs. 1a-b. Bivalved specimen (GK. H. 6054). Adult stage. Loc. point of 138.60 m. in No. 1 tunnel of the Katsurazawa-dam, Ikushumbetsu, Mikasa-city, Central Hokkaido.

Fig. 2. Modeling cast of an imperfect right valve (GK. H. 6053b), showing surface character of the area. Middle stage. Loc. T. MATSUMOTO's loc. IK 2015 along the Pombetsu river in Ikushumbetsu.

Fig. 3. Internal mould of a right valve (GK. H. 6047). Early adult stage. Loc. ditto.

Fig. 4. Internal mould of a right valve (GH. NM. 1084), showing internal character. Middle stage. Loc. an old site of a quarry near the Katsurazawa-dam in Ikushumbetsu.

Fig. 5. Imperfect left valve (GH. NM. 1085), showing surface costation and coarse growth-lines. Middle stage. Loc. ditto.

Fig. 6. Imperfect right valve (GH. NM. 1081a), showing internal character in the immature stage. Adult stage. Loc. ditto.

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1a

1b

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3

5

6

Remarks:—The ontogenetic change is remarkable in this species.

In the early stage, the shell (L=25–35 mm., H=23–32 mm.) is circular to subcircular in outline and the beak located at about two-fifths from the front but sometimes subcentral. The height-length proportion ranges 1 : 1.03 to 1 : 1.10. The surface costation of this stage is quite similar to that of *Myophorella* s. s. Flank is sculptured with about 11, moderately spaced, nodose costae or rows of nodes which are arcuate diagonally. Carinae are absent, but a row of nodes is aligned in place of the three carinae. Area is as large as a third of the flank, and is ornamented with numerous tuberculate costae which are first transverse but oblique later. Escutcheon is narrow, and provided with numerous slightly tuberculate costellae. Median furrow is shallow but rather distinct (see pl. 21, fig. 6).

In the succeeding middle stage, 50–60 mm. in length and 45–50 mm. in height, the shell becomes ovate to triangularly ovate in shape and the beak is shifted at about three-tenths to a third from the anterior end. The height-length proportion is about 1 : 1.20. There are 12 to 14 diagonal and arcuate nodose costae or rows of nodes on the flank. Carinae and sculptures on the area and escutcheon become obsolete, but the coarse growth-lines are well developed on the area.

Shell (L=70–85 mm., H=63–70 mm.) in adult is ovately subtrapezoid to trigonally ovate in outline, and ornamented with 15 to 19 nodose costae or rows of nodes on the flank. The height-length proportion is 1 : 1.10 to 1 : 1.25, and the beak situated at about a fifth to a fourth from the anterior extremity.

In some internal moulds of the right valve (pl. 20, figs. 3 and 5), it is observed that several grooves and ridges behind the posterior adductor scar are oblique to the margin. This feature is sometimes well observed in those of *Steinmannella* (*Yeharella*) *japonica* (YEHARA) and some forms of the Quadratae, Pseudoquadratae and other sections.

Variation:—As mentioned above, this species has a certain degree of variation. For example, the outline and surface sculpture are not always the same even in specimens of similar size. There is a relatively trigonally ovate form (pl. 20, figs. 1a–b; pl. 21, fig. 2), while the holotype and IKEGAMI and OMORI's specimen (1957, pl. 3, figs. 1a–c) have the subtrapezoidal outline. Nodose costae or rows of nodes are somewhat narrowly disposed in the illustrated specimens on fig. 4 in pl. 20 and on fig. 3, in pl. 21, but they are broadly spaced in the others (pl. 20, figs. 1–2; pl. 21, figs. 1–2 and 5). The rows of nodes on the flank are well developed in common specimens (pl. 20, figs. 1–2; pl. 21, figs. 2–3 and 5). On the other hand, some specimens (pl. 20, figs. 5–6; pl. 21, fig. 1) have nodose costae on the flank. Costation on the area and the escutcheon are usually limited to the earliest stage, but rarely observed in the middle stage of some specimen (pl. 21, fig. 4).

Comparison:—This form is easily distinguishable from the others of *Steinmannella* (*Yeharella*) by its subtrapezoidal to triangularly ovate outline and surface costation. As compared with *Trigonia transitoria* STEINMANN from the Neocomian of South America, this form has a smooth area and more prominent nodes on the flank. *Trigonia holubi* KITCHIN from the Neocomian of South Africa is similar to this form, but differs by the prominent umbo and the less numerous costae on the flank. *Trigonia leana* GABB and *T. leana* var. *whiteavesi* PACKARD

from the Chico group of the West Coast in North America differ from this form in the more quadrate outline and the carinae and sculpture on the area are more obsolete. *Steinmannella* (*Yeharella*) *jimboi* KOBAYASHI and AMANO from the "*Trigonia* Sandstone" on the Pombetsu river in the Yubari coal-field of Central Hokkaido has some resemblance, to some specimens of the early adult stage of this species, but the former is represented by a single internal mould. In the outline and the aspect of the area, this species looks like *St.* (*Y.*) *kimurai* (TOKUNAGA and SHIMIZU) and its ally in Honshu from Coniacian to Companian, but the latters have numerous remarkable nodes on the more arcuate and geniculate costation and the area is more broader.

Occurrence:—Abundant in the lower and the upper "*Trigonia* Sandstone" from the Ikushumbetsu district, Mikasa-city, Central Hokkaido. Its range is probably lower Cenomanian to middle Turonian or lowest upper Turonian. Comparable specimens were reported from the same group in the Yubari coal-field in Central Hokkaido. This species is commonly associated with a number of Ammonoids and Pelecypods as listed by IKEGAMI and OMORI (1957), NAKANO (1960), and others.

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Explanation of Plate 21

(All natural size)

Steinmannella (*Yeharella*) *ainuana* (YABE and NAGAO) ....p. 141

Fig. 1. Imperfect left valve (GH. NM. 1083), showing sculpture on the flank. Early adult stage. Loc. an old site of a quarry near the Katsurazawa-dam in Ikushumbetsu, Mikasa-city, Central Hokkaido.

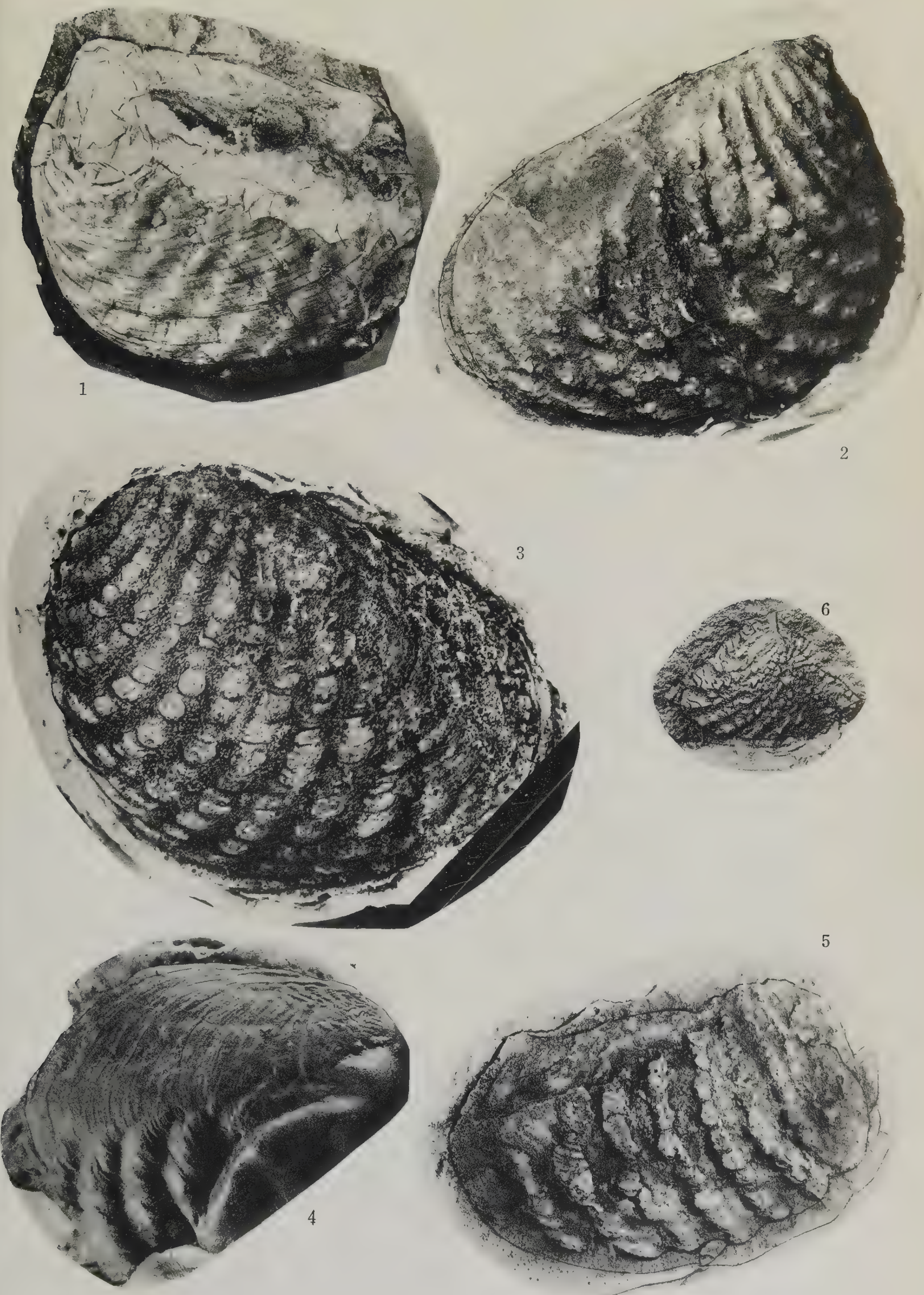
Fig. 2. Gypsum cast of a right valve (GH. NM. 1082). Adult stage. Loc. ditto.

Fig. 3. Gypsum cast of an imperfect left valve (GH. NM. 1091). Adult stage. Loc. ditto.

Fig. 4. Modeling cast of an imperfect right valve (GH. NM. 1092a), showing the sculpture on the area and escutcheon. Adult stage. Loc. ditto.

Fig. 5. Gypsum cast of an imperfect right valve (GH. NM. 1089), Adult stage. Loc. ditto.

Fig. 6. Modeling cast of an imperfect left valve (GK. H. 6046). Immature stage. Loc. MATSUMOTO's loc. 2015 along the Pombetsu river in Ikushumbetsu.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Trans. Proc. Palaeont. Soc. Japan, N. S., No. 44, p. 146, Dec. 15, 1961

ˋHORT NOTE

7. FURTHER NOTE ON A FOSSIL PALM TRUNK FROM KANAZAWA*

YUDZURU OGURA

Botanical Institute, University of Tokyo

The writer described in 1952 a fossil palm trunk, situated in Kenroku Park at Kanazawa as an ornamental stone, called "Take-ne-ishi", as *Palmoxylon Maedae* (OGURA, 1952). Though this fossil was worth while in fine preservation of tissues of trunk and roots, it was regretful that its habitat was unknown. A few years later, the writer received a fragment of a fossil palm trunk, found at a river running Kanazawa. Its tissue was very similar to, but a little different from the former species, and he described it in 1955 as *Palmoxylon kagaense* (OGURA, 1955). This specimen might have been drifted from the stratum, the green tuff of the Miocene age, where other fossil plants have been found.

Meanwhile another specimen of a fossil palm trunk was found at the suburbs of Kanazawa among the conglomerate, perhaps coming from the same stratum mentioned above.** This specimen consists of a basal part of the trunk and the root mass surrounding it, the diameter of the trunk being 35 cm, and that of the root mass 55 cm (Fig. 1). The preservation is not very fine, but it is enough to observe the tissue. Distribution and construction of vascular bundles, structure of sclerenchymatous sheaths surrounding bundles (Fig. 2), porosity of fundamental tissue, and structure of small sclerenchymatous strands in fundamental tissue are the same with those of Take-ne-ishi, and the writer intends to identify this new specimen as *Palmoxylon Maedae*.

Fig. 1. A new specimen of *Palmoxylon Maedae.*

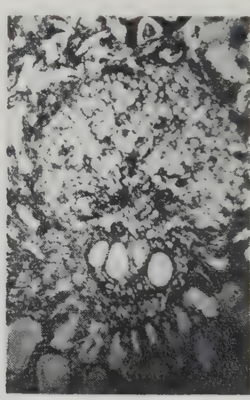

Fig. 2. Cross section of a vascular bundle and is sclerenchmatous sheath. ×35.

The discovery of this fossil palm is interesting, as it suggests the habitat of Take-ne-ishi, that is, it might have been found near Kanazawa and may be of a Miocene origin.

* Received July 2 , 1961.

** 金沢市袋板屋町（旧称一石川県河北郡浅川村袋）大辺栄照氏採集 (1960), 現在松平栄造氏所有.

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Trans. Proc. Palaeont. Soc. Japan, N. S., No. 44, pp. 147-151, pl. 22, Dec. 15, 1961

415. NEW SUBGENUS OF PEARL OYSTER, *EOPINCTADA*, FROM THE CRETACEOUS MIFUNE GROUP IN KUMAMOTO PREFECTURE, JAPAN*

MINORU TAMURA

Faculty of Education, Kumamoto University

熊本県の白堊紀御船層群産の *Pinctada* の新亜属：御船町上梅木及び益城町川内田東方の御船層群下部層産 *Pinctada* (*Eopinctada*) *matsumotoi* TAMURA（新亜属・新種）を記載した。本種は白蝶貝—*Pinctada maxima* (JAMESON)—に形質及産状で最も近く，特に hinge structure は全く一致する。しかし外形が三角形で，他の異る点も考慮して *Eopinctada* 亜属を設定した。CHAVAN による *Pinctada crassa* を除くと *Pinctada* は従来中生層よりは報告されておらず，我が国のジュラ紀層からは *Pteria* を多産すること，現棲あこや貝の養殖が我が国で盛なことを併せ考えると，本種の産出は *Pinctada* の系統上興味ある存在と思はれる。

又御船層群下部層の堆積環境としてはその産出化石より一部に brackish の要素もあるかに考えられていたが，本種の産出は浅海の堆積環境を更に強く支持するものと思う。

田 村　実

The occurrences of pearl oyster, *Pinctada*, from the Tertiary are exceedingly rare and none from the Cretaceous insofar as the writer is aware, although *Pinctada crassa*, which seems for the writer to belong to another genus, has been reported from Astartian of Calvados (CHAVAN, 1952). In his fossil hunting, the writer obtained many pearl oysters from a sandstone bed in the lower formation of Middle Cretaceous Mifune group (MATSUMOTO, 1939) at Kami-Umeki, Mifune town and east of Kawauchida, Mashiki town, both in Kumamoto Prefecture. The lower formation of the group yields a rich pelecypod fauna of which many species are coexistent with the Goshonoura group (MATSUMOTO, 1936). The fauna was listed by MATSUMOTO (1939) but has not yet been described except for *Matsumotoa japonica* OKADA (OKADA, 1958).

In this report, the writer established *Eopinctada*, a new subgenus of *Pinctada*, on *Pinctada* (*Eopinctada*) *matsumotoi* TAMURA, new species, from the lower formation. Some considerations are made as to the depositional environment of the formation.

Here the writer expresses his sincere gratitudes to Prof. T. KOBAYASHI of the University of Tokyo for his constant guidance and supervision of the manuscript and to Mr. Y. TAKEMURA for his useful information on recent pearl oysters.

Family Pteriidae

Genus *Pinctada* ROEDING, 1798

Eopinctada TAMURA, new subgenus

Type-species: — *Pinctada* (*Eopinctada*) *matsumotoi* TAMURA, new species.

Diagnosis:—Shell rather small for

* Received May 17, 1961; read at 79th meeting of the society at Kanazawa, Sept. 23, 1961.

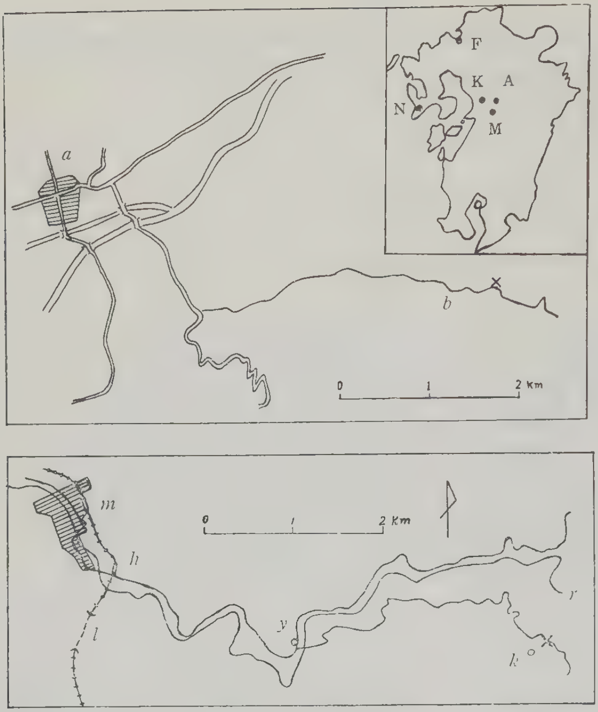


Fig. 1. Index map

A, a : Kiyama
b : Kawauchida
F : Fukuoka
h : Hetami
K : Kumamoto
k : Kamiumeki
l : Yuen-line
M, m : Mifune
N : Nagasaki
r : Mifune river
y : Yokono
× : fossil locolity

Table 1. Comparison among *Pinctada* s. str., *Eopinctata* and *Pteria* (*Magnavicula*)

genera / characters	*Pinctada*		*Pteria* (*Magnavicula*)
	Pinctada s. str.	*Eopinctada*	
shape	quadrate, anterior margin produced	obliquely trigonal, anterior margin not produced	obliquely trigonal but posterior wing prominent
umbo	not terminal	terminal	not terminal
ligament area	fairly wide	wide	narrow
adductor impression	not deeply impressed, crescentic	deeply impressed, crescentic but nicked medially	not deeply impressed, roundedly crescentic
non-nacreous border	wide	not present	wide
surface	rugose or scaly but not prominent in older form	probably smooth	nearly smooth

genus, depressed, nearly equivalve, inequilateral, obliquely trigonal in outline and higher than long, anterior and posterior parts not alate; umbo prosogyrate and nearly terminal; surface smooth; hinge area wide, obliquely divided into three parts (anterior, median groove, posterior); byssal notch fairly deep especially in right valve; one great crescentic adductor scar strongly impressed; test fairly thick and nacre wide.

Remarks:—In regard to shape of adductor scar and the oblique shell form, *Eopinctada* resembles *Pteria* (*Magnavicula*) of which hinge structure is similar to that of *Eopinctada*, but the posterior extremity is not alate and the umbo terminal in the former.

In the hinge structure *Eopinctada* perfectly agrees with *Pinctada* s. str. (TAKEMURA and KAFUKU, 1957), although

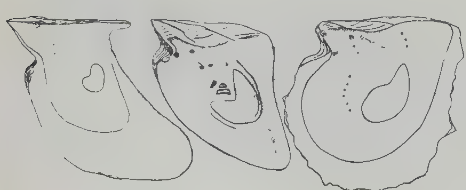


Fig. 2. Interior of *Pteria* and *Pinctada* (left valve)

A: *Pteria* (*Magnavicula*) *penguin* (ROEDING) ×¼

B: *Pinctada* (*Eopinctada*) *matsumotoi* TAMURA ×½

C: *Pinctada maxima* (JAMESON) ×¼

its area is wider in the former. The non-alate posterior part of the shell agrees with that of *Pinctada*. The left valve of the Pteriidae is generally more convex than the right but the difference between them is not perceived in *Eopinctada* as in the old shell of some *Pinctada*. It is said that the non-nacreous border of the old form of some *Pinctada* as *P. maxima* and *P. margaritifera* is broken and the surface is not so scaly in younger shell. The non-nacreous border is not present in *Eopinctada* and surface nearly smooth. The thick test in hinge part of *Eopinctada* is seen also in old *Pinctada*. *Eopinctada* has many characteristics seen in old *Pinctada*. The shape of the shell is a little different from that of *Pinctada*. The impressions of pallial muscles are not observable distinctly but somewhat resemble those of *Pinctada*.

Pinctada martensii (DUNKER) is a well-known pearl oyster and lives in the shallow sea of west Japan. The pearl culture is prosperous in Japan. The occurrence of *Pinctada*, however, has never been reported from Mesozoic formation and is very rare in Tertiary. The only one exception is *Pinctada crassa* by CHAVAN (1952) from Astartian of Calvados. His species, however, has a prominent posterior wing and the specimen illustrated in the plate 2 lacks of posterior part of shell. This species seems for me to belong rather to *Pteria*, probably occupying near position to *Magnavicula*, than *Pinctada*. But fossil *Pteria* is common in the Jurassic (HAYAMI, 1958; TAMURA, 1960). *Eopinctada* well agrees in many characters with *Pinctada* s. str. and in a few others with *Pteria*. Whether *Pinctada* s. str. was derived directly from either *Eopinctada* or *Pteria* (*Magnavicula*) is a matter of discussion, but *Eopinctada* is most akin to *Pinctada* s. str. especially *Pinctada maxima* (JAMESON).

Distribution:—The type species occurs in the Mifune group (approximately Cenomanio-Turonian) of Central Kyushu.

Pinctada (*Eopinctada*) *matsumotoi* TAMURA, new species

Pl. 22, Figs. 1–4

Description:—Shell small for genus, depressed; equivalve exclusive of convexity and byssal notch, inequilateral, higher than long and trigonal in outline; right valve a little more convex than left; hinge margin nearly straight and not alate posteriorly; posterior margin nearly straight or slightly arcuate; anterior rounded but profoundly excavated below umbo; umbo prosogyrate, terminal; surface smooth; hinge area very wide, divided into three obliquely arranged parts in which the median part is a pit or ligament groove; adductor impression large and deep, situated near center, crescentic in shape embracing large impression of retractor; several impressions of pallial muscles not distinct; nacre wide and non-nacreous border probably absent.

Measurement:—

	Length	Height
Holotype (right, MM 3704)	55 mm	68 mm
Paratype (left, MM 3705)	45 mm	50 mm
Paratype (right, MM 3706)	45 mm	50 mm

Observation:—This species is represented by many specimens which display all characters of both valves almost perfectly. The byssal notch is slightly deeper in the right valve than the other. The shell convexity is stronger in right than in left valve. No other difference is found between both valves. The lower part adjacent to byssal notch is not so strongly produced as in *Pinctada* s. str. Morphic variation among many individuals of this species is small.

It has been thought that the lower formation of the Cretaceous Mifune group is a sediments in an embayment under shallow marine water as can be judged from stratigraphic and palaeontological evidences. No ammonite has ever been found and trigoniae and *Inocerami* are very rare in the formation. MATSUMOTO reported some elements of brackish inhabitants (MATSUMOTO, 1939; OKADA, 1960). Recent *Pinctada* is known to exist in warm and pure marine environment. The occurrence of *Pinctada* (*Eopinctada*) *matsumotoi* from the lower formation of Mifune group is an interesting fact not only in thinking the phylogeny of *Pinctada* but also in thinking the environment of deposition of

Explanation of Plate 22

Pinctada (*Eopinctada*) *matsumotoi* TAMURA, new species

Fig. 1. Plaster cast of the internal mould of a left valve; showing hinge area. (MM 3707).

Fig. 2. A broken left valve; showing exterior. (MM 3708).

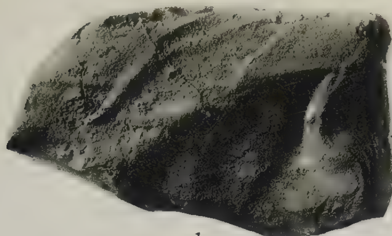
Fig. 3. Plaster cast of the internal mould of the holotype right valve; showing internal side. (MM 3704).

Fig. 4. Plaster cast of the internal mould of a left valve; showing interior. (MM 3705).

All are in natural size and collected at Kami-Umeki, Mifune town, Kumamoto Prefecture and stored in the Geological Institute, University of Tokyo.

Pinctada maxima (JAMESON)

Figs. 5, 6. Interior of left valve; storea in Geol. Inst. Univ. Tokyo; $\times 1/3$.



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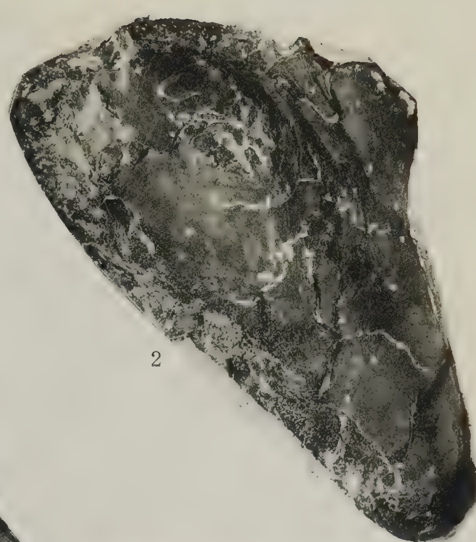

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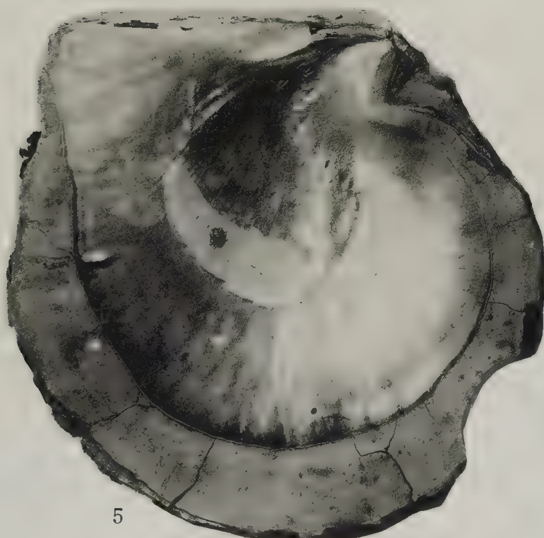

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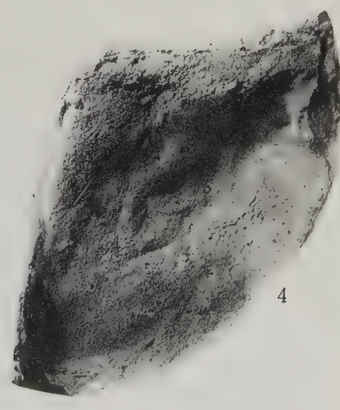

4

the lower formation of the group. Further an echinoid fossil is reported to occur in the formation (OKADA, 1958). So the "brackish elements" of the pelecypod fauna of the formation are necessary to restudy more strictly.

Comparison:—The wide hinge area, non-alate posterior part and shell structure without non-nacreous border are characteristic of the species and no comparable species of "*Pteria*" has been reported insofar as the writer is aware. *Pinctada maxima* (Jameson), however, is most akin to the species and the comparison between *Pinctada* (*Eopinctada*) *matsumotoi* and *P. maxima* was discussed already.

Occurrence:—Sandstone (fossil bed 0.3–0.5 m thick) on the roadside of Kami-Umeki, through which the road extends from Mifune to Mizukoshi. At this locality, specimens of this species are crowded. Another locality is on the road side, east of Kawauchida, Mashiki town. Several thin (0.1–0.3 m thick) layers of sandstone and shale yield numerous small pelecypods. Only two fragments of this species were obtained there.

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SHORT NOTE

8. *AMYGDALOPHYLLUM* SP. FROM HYOGO PREFECTURE, JAPAN*

NOBUO YAMAGIWA

Osaka University of Liberal Arts and Education

The present writer has discovered *Amygdalophyllum* sp. from a crystalline limestone lens within a schalstein member at Mannotoge, Kozuki-cho, Sayo-gun, Hyogo Prefecture, Japan. This locality lies at the southwestern part of the Tamba terrain, and near the Maizuru zone. GOTO (1960) recently studied the Palaeozoic formations in this district, and discovered the Lower & Middle Permian.**

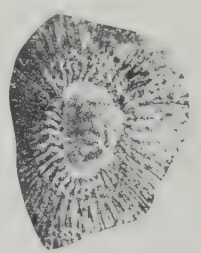
Amygdalophyllum sp. resembles *A. naosoidea* MINATO in many respects. The latter one was already reported by MINATO & KATO (1957) from the lower Upper Carboniferous of the Akiyoshi district. Besides, *A.* cfr. *naosoidea* was more recently discovered by the writer (unpublished) from the zones of *Profusulinella-Fusulinella* of the Atetsu district. Therefore, the rock containing the present form may be lower or middle Upper Carboniferous in age.

Acknowledgements are due to Drs. S. SAKAGUCHI & K. NAKAZAWA for the critical reading of the manuscript, to Mr. K. OSAFUNE, the collector of this specimen.

Amygdalophyllum sp. indet.

Text-fig. 1

Corallum simple. Calicural diameter more than 13 mm in transverse section. Septa of two orders, major and minor, alternating. Numbering about 41 for major septa and as many for minor ones. Major ones rhophaloid in shape, most of them reach the axial structure. Minor ones thinner and shorter than the major. Sometimes major and minor septa of continuous type in distal part. No external wall and peripheral part of septa is seen. Axial structure oval in shape and solid. Longitudinal section unobservable.



Text-fig. 1. *Amygdalophyllum* sp. indet.
Transverse section (×1.8)
Reg. no. 61001.

Comparison: This form is related to *Amygdalophyllum naosoidea* MINATO (1955) in many respects, but differs from the latter in having numerous septa.

* Received Sept. 4, 1961.

** These formations lie southwest of the Permian formations in the Tamba district studied by SAKAGUCHI (1961), and are in no contact with the latter, because of having igneous rocks between them.

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416. A NEW SPECIES OF THE GENUS *CLISIOPHYLLUM* FROM THE UPPER CARBONIFEROUS OF EHIME PREFECTURE, SOUTHWEST JAPAN*

KEN-ICHI ISHII & NOBUO YAMAGIWA

Osaka City University & Osaka Gakugei University

愛媛県上部石炭系産の *Clisiophyllum* 属の一新種：愛媛県東宇和郡黒瀬川村重谷地域上部石炭系中部統の竜泉層群及び同村板取川地域の板取川層群中から *Clisiophyllum* 属の一新種 *C. ehimense* を発見，記載し，*C. awa* 及び *C. awa atetsuense* との差異について論じた。

石井健一・山際延夫

The species described in this article was collected by K. ISHII from a reddish limestone lens, intercalating tuff breccia, within the Ryuzen group at Omodani, Kurosegawa village, Higashiuwa-gun, Ehime Prefecture, Southwest Japan and from a limestone within the Itadorigawa group at Itadorigawa of the same village.

The Ryuzen group was recently studied by NAKAGAWA, SUYARI, ICHIKAWA, ISHII & YAMASHITA (1959). According to them, this group is composed of basic tuffs and volcanic rocks, intercalating black mudstone and limestone lenses. Fusulinid fossils such as *Fusulinella fluxa* (LEE et CHEN), *Fusulinella* cfr. *pseudobocki* (LEE et CHEN) and *Fusulinella* spp. were discovered by them from the limestone lens of this group at Omodani.

One of the present writers (ISHII, 1956, 1958, 1961) recently studied in detail the Itadorigawa group. According to him, this group is composed of limestones, intercalating mudstones and sandstones. Also he divided this group into three fossil zones (It_1 It_2 and It_3) on the basis of fusulinid fossils; the It_1 fossil zone is characterized by *Fusulinella itadorigawensis* ISHII (MS) and *Fusulinella simplicata* TORIYAMA, the It_2 fossil zone by *Fusulina kanmerai* ISHII, *Fusulina shikokuensis* ISHII, etc., and the It_3 fossil zone by *Fusulinella bocki* MÖLLER. One specimen of the coral species described in this paper, was discovered from the It_2 fossil zone.

Judging from the above-stated associations of fusulinids, the present writers consider that the rocks containing the present coral species are the middle Upper Carboniferous in age.

The present coral species closely resembles *Clisiophyllum awa* (MINATO) from the Upper Carboniferous of several districts in Southwest Japan; namely, the *Fusulinella* zone of the Omi district (MINATO, 1955), the *Clisiophyllum awa* zone of the Akiyoshi district (MINATO & KATO, 1957), the zone of *Nagatophyllum* fauna of the Taisyaku district (MINATO, 1951; YOKOYAMA, 1957, 1959) and the lowermost Upper Carboniferous of the Atetsu district (YAMAGIWA, (unpublish-

* Received June 1, 1961; read at the 78th meeting of the Society at Akita, May 13, 1961.

ed)).* It is also related to *Clisiophyllum awa atetsuense* (MINATO et NAKAZAWA) from the lowermost Upper Carboniferous of the Atetsu district (MINATO & NAKAZAWA, 1957; YAMAGIWA (unpublished)).

Systematic description

Genus *Clisiophyllum* DANA, 1846**

Clisiophyllum ehimense sp. nov.

Plate I, Figures 1, 4, 5

Corallum simple, large in size. Calicular diameter usually 20-22 mm in transverse section. External wall relatively thin. Dissepiments mostly arranged concentrically or angulo-concentrically. Septa of two orders, major and minor, alternating. Major ones usually 32-38 in number. In mature stage, they reach near the axial structure, somewhat rhopaloid except in outer area where they are more or less sinuous. In mature stage, minor ones more or less sinuous, relatively thin and usually 1/2-2/3 the length of the major. However, the former usually 2/3-3/4 the length of the major in full mature stage. Cardinal septum slightly shorter than other major ones. Axial structure composed of a short median plate, less numerous septal lamellae and convex subvesicles, concentrically arranged with convex sides facing outwards.

In longitudinal section, broad peripheral area composed of about 8 rows on nearly equal vesicles, their convex sides facing inwards as well as upwards or inwards. Tabulae incomplete, widely spaced and sloped up to the axial structure, their convex sides facing upwards and outwards. Tabellae show dome-like structure. Tabularium occupies 3/5 entire space of the corallite. Axial structure occupies 2/5 the width of tabularium.

Material:—Holotype, Reg. no. PC 2000a, b. Another specimen, PC 2001. These specimens are deposited in the Division of Geoscience, Fac. Sci., Osaka City Univ.

Occurrence:—The holotype occurs from the Ryuzen group of Kurosegawa-village, and another specimen occurs from the It_2 fossil zone of the Itadorigawa group at Itadorigawa, Kurosegawa-village, Higashiuwa-gun, Ehime Prefecture.

Comparison:—This new species is closely related to *Clisiophyllum awa* (MINATO, 1951, p. 5, figs. c/1-d/3; 1955, pp. 137, 138, pl. 5, fig. 1, pl. 17, fig. 7, pl. 33, fig. 9, pl. 36, fig. 8, pl. 37, fig. 4, text-fig. 13, figs. c/1-d/3; SAKAGUCHI & YAMAGIWA, 1958, pp. 168, 169, pl. 1, figs. 1-3) in many respects. It differs, however, from the latter (Pl. 23, fig. 2) in having septal lamellae and a less prominent median plate in axial structure in transverse section. It resembles *Clisiophyllum awa atetsuense* (MINATO & NAKAZAWA, 1957, p. 18-20, pl. 3, figs. 3, 4) in many respects, but differs from the latter (Pl. 23, fig. 3) in having septal lamellae and a less prominent median plate in axial structure in transverse section and no trabecular-like ridge in axial structure. It is related to some species of the genus *Dibunophyllum* in having less numerous septal lamellae in axial structure in transverse section, but differs from the latter in having a short median plate and longer minor septa.

* OKIMURA (1958) considered the age of the rocks containg *Clisiophyllum awa* (MINATO) and *Clisiophyllum awa atetsuense* (MINATO et NAKAZAWA) from the Atetsu district, Southwest Japan to be Lower Carboniferous (Namurian).

** *Clisiophyllum* DANA, 1846 [=*Clisaxophyllum* GRABAU in CHI, 1931] (See WELLS & HILL (MOORE, ed.) 1956, F. 286).

Acknowledgements

The writers wish to express their hearty thanks to Assist. Prof. Koichiro ICHIKAWA (Osaka City Univ.) and Assist. Prof. Shigeo SAKAGUCHI (Osaka Gakugei Univ.) for effective counsel and reading of the manuscript. Thanks are also due to Assist. Prof. Keiji NAKAZAWA (Kyoto Univ.) who lent them a part of the holotype specimen of *Clisiophyllum awa atetsuense* (MINATO et NAKAZAWA) for the sake of comparison.

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Postscript: More recently, KANMERA reported a new species of the genus *Clisiophyllum* (*C. subramosum*) from the middle Upper Carboniferous formation (the *Beedeina* [="*Fusulina*"] zone) of the Yayamadake limestone of Kyushu (KANMERA 1961, Upper Carboniferous Corals from the Yayamadake Limestone, Kyushu, *Mem. Fac. Sci., Kyushu Univ., ser. D, Geol. vol. 10, no. 2*, pp. 211–214, pl. 14, figs. 1 12, pl. 15, fig. 11, text-fig. 3).

The present new species resembles *C. subramosum* KANMERA in general features, especially in the axial structure and the mode of dissepments. But the former can be distinguished from the latter in having a simple corallum and dome-like axial tabellae in longitudinal section.

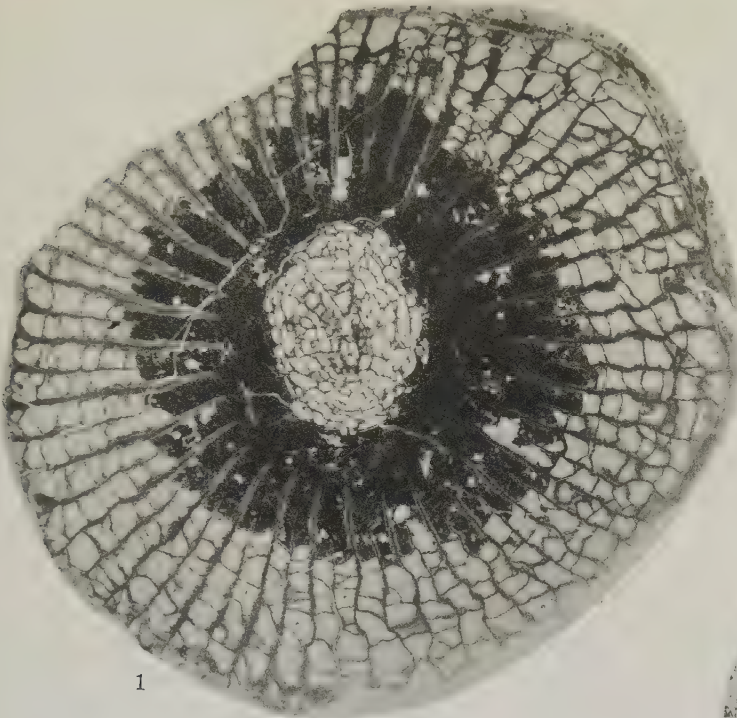
Explanation of Plate 23

Figs. 1, 4, 5. *Clisiophyllum ehimense* ISHII et YAMAGIWA (sp. nov.)

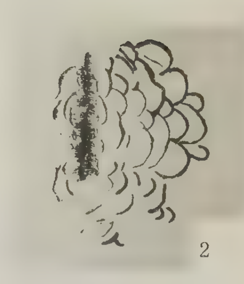
1. Transverse section in full mature stage. Reg. no. PC 2001, Loc. a limestone lens of Itadorigawa, Kurosegawa-village, Higashiuwa-gun, Ehime Prefecture....It_2 fossil zone of the Itadorigawa group. ×4.
4. Transverse section in mature stage. Holotype (Reg. no. PC 2000a), Loc. Omodani, Yusukawa of Kurosegawa-village, Higashiuwa-gun, Ehime Prefecture....Ryuzen group. ×4.
5. Longitudinal (somewhat oblique) section in mature stage. Holotype (Reg. no. 2000b), Loc. Ibid. ×4.

Fig. 2. Axial structure in transverse section of *Clisiophyllum awa* (MINATO), 1951, (after MINATO, 1951, p. 4, fig. Cl)

Fig. 3. Axial structure in transverse section of the holotype of *Clisiophyllum awa atetsuense* MINATO et NAKAZAWA), 1957, (M. & N. 1957, pl. 3, figs. 3, 4). This transverse section (Reg. no. JPC-40029) is a part of the holotype, and deposited in Geol. & Min. Inst., Univ. Kyoto. ×4.2.

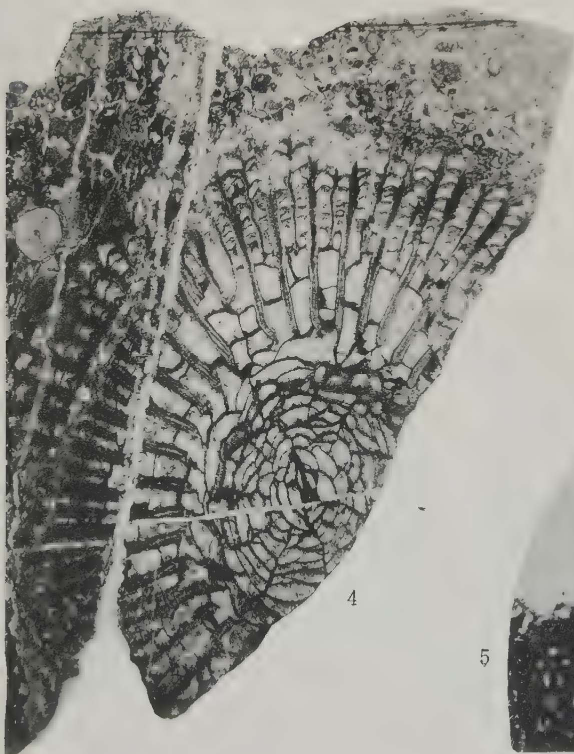


1

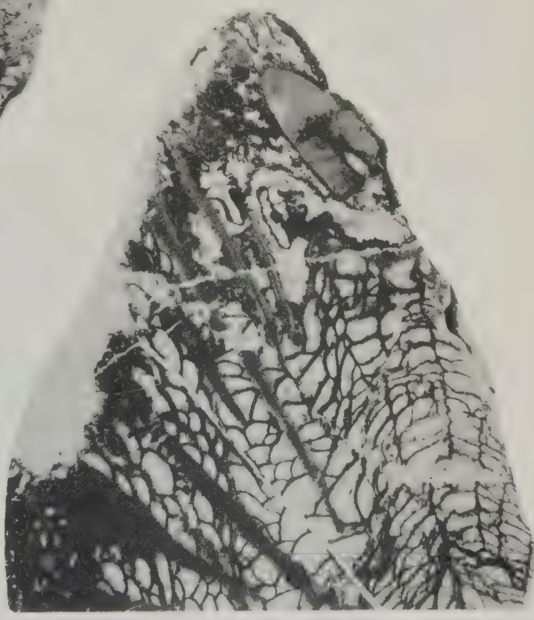


2

3



4



5

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417. ON THE EVOLUTION OF THE OSMUNDACEAE WITH DESCRIPTIONS OF TWO NEW SPECIES*

SEIDO ENDO

「ゼンマイ」科の進化について，及び2新種の記載：植物界に於て進化の問題をしらべるには「ゼンマイ」科の植物が興味多く，且つ重要な材料の一つであろう。此科の植物は其葉柄の維管束が特有な形態をなして居るので他の科のものとたやすく区別が出来るし，かつ古生代から現在まで多数のものが知られて居り其茎の構造も化石として研究されて居るので内部構造も系統的に進化の経路をたどることも出来，又其子囊群の出来る場所も時代的に変化して居る事が明らかになったので，是等の進化の事実を述べ，最後に此科の植物化石の2新種を記載した。

遠藤誠道

On the evolution of the vegetable kingdom, the Osmundaceae is one of the most interesting and important family. All the species of the family are crescentic petiolar bundle with several adaxial protoxylem. This crescentic petiolar bundle is remarkable for its similarity from the Palaeozoic genera to that of the living *Osmunda*.

Among the family, the most important living species are as follows:

1. *Todea barbara* MOORE, (fig. 4), this now exists in South Africa, Australia and New Zealand etc. The fertile pinnules of the species are similar with the sterile pinnules, and these occur on the same pinnae of the same frond.

2. *Osmunda claytoniana* L. (fig. 6), this now exists in North America, East Asia and Central Honshu of Japan.

3. *Osmunda bromeliaefolia* COPLAND, this species now exists in Southern Japan (Shikoku, Kyushu) Ryukyu, Bonin Is. and Formosa.

In the above two species (*O. claytoniana* and *O. bromeliaefolia*), 2 or more pinnae of lower part of the frond are always fertile, and the others are sterile.

The external feature of the fertile pinnae are quite different from the sterile.

4. *Osmunda cinnamomea* L. (fig. 7) this now exists in North and South America, East Asia, and in Japanese Islands (including Sakhalin and Kuril Is.). The fertile frond and the sterile frond of the species are different frond that these fronds arise from the same subterranean stem.

5. *Osmunda regalis* L. (fig. 8) *Osmunda japonica* THUNB.=*Osmunda regalis* L. var. *japonica* MILDE (fig. 5). This is almost cosmopolitan species in geographical range. Commonly, the fertile frond of the species differs from the sterile frond, as well as *Osmunda cinnamomea*, although these fronds occur from the same subterranean stem, it is, however, the fertile pinnae occurs, rarely, on the uppermost part of the sterile frond.

Next, the most important geological

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records are as follows (SEWARD, 1910):

1. *Zalesskya gracilis* (EICHWARD)
2. *Thamnopteris schelchtendalii* (EICH.)

These two species were recorded from the upper Permian beds in Russia, and these are protostele in the stele structure.

3. *Osmundites kolbei* SEWARD, the species was recorded from Cape Colony (probably Wealden in age). The fronds with the stem were found imperfectly preserved impressions of fronds referred to *Cladophlebis denticulata* SEWARD. The stem structure is mixed pith, composed of parenchyma and true tracheae.

4. *Osmundites Dunlopi* KIDSTON and GWYNNE-VANGHAN.

This species was described from the Jurassic rocks in the Otago district of New Zealand in association with *Cladophlebis denticulata* SEWARD. The stem structure is similar to *Todea barbara* of the recent species.

5. *Osmundites Dowkeri* CARRUTHERS.

This species was described by CARRUTHERS from the Lower Eocene beds at Herne Bay; the pith is composed wholly of parenchyma and the xylem ring is continuous. From this type, by expansion of the xylen ring and by the formation of overlapping leaf-gaps, the form represented by *Osmunda regalis* was reached.

6. *Osmundites skidegatensis* PENHALLOW.

This species was described by PENHALLOW from the Lower Cretaceous of Canada.

PENHALLOW figures a fragment of a leaf bearing a superficial resemblance to that of existing *Osmunda Claytoniana*.

7. *Todites Williamsoni* (BRONGNIART)

The species was recorded by BRONGNIART, under the name *Pecopteris Williamsoni*; afterwards, it was revised by A.C. SEWARD. In the structure of the sporangia and in the general habit of the fertile fronds, these characters are quite similar to the recent species *Todea barbara*. In *Todites Williamsoni*, the fertile pinnules and the sterile pinnules occur on the same pinnae of the same frond; and the fertile pinnules are quite similar to the sterile.

The sterile pinnae of *Todites Williamsoni* is similar to the pinnae of *Cladophlebis denticulata* SEWARD.

In such a case, it is not easy to distinguish the sterile frond of *Todites Williamsoni* from *Cladophlebis denticulata*.

As already stated; in the stele structure, *Zalesskya*, and *Thamnopteris* etc. of the Paleozoic stems are a primitive type "protostele", while in the most common recent species, *Osmunda regalis*, is advanced type "soleno-stele, and in the Mesozoic stem *Osmundites Kolbei*, the stele structure is intermediate type between the protostele and the solenostele; that is mixed pith, composed of parenchyma and true tracheae; still more, in the Eocene species *Osmundites Dowkeri*, the pith is composed wholly of parenchyma and approach to recent *Osmunda regalis*.

The another Mesozoic stem *Osmundites Dunlopi* shows a closer approach to *Todea barbara* than to recent species of *Osmunda*. Therefore, the stem structure of *Todea barbara* is a primitive type, as well as Mesozoic *Osmundites Dunlopi*.

The external habit of sterile pinna in *Todites Williamsoni* is quite similar to *Cladophlebis denticulata*, as SEWARD says, and it is quite similar to the sterile pinnae of *Osmunda claytoniana* and the sterile frond of *Osmunda cinnamomea*.

In the habit of fertile frond, *Todea barbara* is a most primitive, and *Osmunda cinnamomea* is a most evolved type, *Osmunda claytoniana* and *Osmunda bromeliaefolia* are intermediate type. Generally, in the habit of fertile frond,

Osmunda regalis is in the advanced stage, as well as *Osmunda cinnamomea* than *Osmunda bromeliaefolia* and *Osmunda claytoniana;* the former (*O. regalis*), occurs, rarely, fertile pinnae on the uppermost part of the same frond, while the latters (*O. bromeliaefolia* and *O. claytoniana*) occur, always, at the lowest or lower part of the pinnae in the same frond.

The fertile pinnae of *Osmunda bromeliaefolia* occur at the lowest part of the frond; and it occurs, gradually, in the upper part of the frond; in this case, the lowest pinna of the frond become to sterile pinna; therefore, the habit of the uppermost fertile pinnae of the frond of *Osmunda regalis* are in evolved stage than the common habit of *Osmunda claytoniana* or *Osmunda bromeliaefolia.*

Then, the fossil of *Osmunda bromeliaefolia* was described by H. MATSUO (1959) from the Miocene plant beds of Noto peninsula, Ishikawa Prefecture, Honshu, Japan.

H. MATSUO described the species as *Osmunda bromeliaefolioides*, though it revised erroneously to *Osmunda lignitum* MATSUO's *Osmunda bromeliaefolioides* is quite similar with the frond of living *Osmunda bromeliaefolia* in its habit and special nervation of the pinnules, and it can not be identified to the another species.

The frond of *Osmunda bromeliaefolia* has a special and most characteristic nervation. According to the character of the nervation, it may be, safely, identified with *Osmunda bromeliaefolia* COPLAND, although, the fact that no sporangia have been found is a fatal objection to the identification, but, in this case, it may be possible. The frond of *Osmunda bromeliaefolia* may be briefly described as follows:

1) *Osmunda bromeliaefolia* (MATSUO)

Pl. 24, Figs. 2 and 3.

Description:—Frond bipinnate, pinnae long lanceolate in shape, apex acute, base cuneate, length 10± cm., maximum width of the pinnae ca. 1.5 cm. subopposite or alternate to the rachis. Margins, deeply incised or dissected at the middle and upper parts of the pinnae, and entire or serrated in the lower part or basal part.

Midrib of lobes (or pinnules) distinct, secondary nerves simple or dichotomously branching, 2 or more in number, and it has, very often, another isolated nerve in the same lobe (or pinnule), which is dichotomously branching or simple. Texture coriaceous.

Remarks:—It is quite rare that the same lobe (or pinnule) has the another isolated one nerve in addition to the midrib. This is unknown to the present writer in the frond of the filicales, except the present species. Therefore, it may be same species to *Osmunda bromeliaefolia.*

According to MATSUO, the present species occurs from the Miocene beds of the upper part of Noto flora formation, Nakajima-machi, Kashima-gun, Ishikawa Prefecture.

2) *Osmunda regalis* L. var.?

Pl. 24, Fig. 1.

Description:—Frond bipinnate, pinnae lanceolate in shape, apex obtuse, base inequilateral; length 5 cm.± maximum width ca. 2 cm., arrangement of the pinnae to the rachis, alternate or subopposite. Margins entire or minutely serrated. Midrib of the pinnae, stout and distinct, secondary nerves dichotomously once or twice branching, rarely, simple, abundant in number. Texture coriaceous.

Remarks:—The present material is quite similar to the recent species. OISHI and HUZIOKA (1941) described *Osmunda japonica* THUNB. Subsp. nov. from the

Ishikari Coal fields. It may be same species with the present material. But the fact that no sporangia have been found is a fatal objection to this identification.

The present material was collected from the Eocene *Woodwardia* formation of Shimizusawa, Yubari-City, Hokkaido, Japan.

References

MATSUO, H. (1959): A Revision of the Miocene Fern of *Osmunda bromeliaefolioides* MATSUO from Noto peninsula in the Inner-side of Central Japan, "*The Science Reports of the Kanazawa University*" *Vol. VI, No. 2*, pp. 85–90.

OISHI, S. and HUZIOKA, K. (1941): Studies on the Cenozoic Plants of Hokkaido and Karahuto. (1). Ferns from the *Woodwardia* Sandstone of Hokkaido. "*The Journal of the Faculty of Science, Hokkaido Imp. Univ.*" *Ser. IV, Vol. VI, No. 2*, pp. 179–181, pl. xxxix, figs. 1–8, 4a.

SEWARD, A. C. (1910): Fossil plants, vol. 2, pp. 324–346.

Explanation of Plate 24

Fig. 1. *Osmunda regalis* L. var.? Enlarged and Restored.
Collected from the Eocene *Woodwardia* zone of Ishikari Coal-field, Shimizusawa, Yubari-city, Hokkaido, Japan.

Figs. 2, 3. *Osmunda bromeliaefolia* COPLAND. ×2.
Collected by H. MATSUO, from the Miocene Tajiri mudstone beds, Tsuchikawa, Nakajim-machi, Kashima-gun, Ishikawa Prefecture, Honshu, Japan.

Fig. 4. *Todea barbara* MOORE
(a), a part of frond (ca. 1/2 nat. size). (b), a part of fertile pinnule (enlarged). (c), Sporangium, much enlarged, after Kunze.

Fig. 5. *Osmunda regalis* L. var. *japonica* MILDE.
Showing the frond with the fertile pinnae on the upper part of the frond. Cultivated by S. ENDO, much reduced.

Fig. 6. *Osmunda claytoniana* L. Much reduced. After ANDREWS, Ancient plants 1947.

Fig. 7. *Osmunda cinnamomea* L. " "

Fig. 8. *Osmunda regalis* L. " "


1
2
3
4a
4b
4c
5
6
7
8

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418. ON THE NEW GENUS *METADOLIOLINA**

KEN-ICHI ISHII

Division Geosci., Fac. Sci., Osaka City Univ.

and

YASUO NOGAMI

Geol. and Miner. Inst., Coll. Sci., Kyoto Univ.

新属 *Metadoliolina* について：従来日本で *Pseudodoliolina* に編入されていた種に，形態的にも，生層序的にも，ことなった 2 つのグループがあることをみとめた。これらの 2 つのグループの形態上の主要な違いは一方は殻壁が未分化壁からなり，他方は透明層または蜂窩層を生ずるような分化壁からなっているということである。前者は *Pseudodoliolina ozawai* (*Pseudodoliolina* の模式種) で代表されるグループであり，後者は *Pseudodoliolina gravitesta* で代表されるグループである。筆者等はこれらの殻壁の構造を重視して，後者のグループにたいし新属 *Metadoliolina* を提唱した。*Metadoliolina* は *Pseudodoliolina* から分化したと考える。

石井健一・野上裕生

In the course of our study on some Permian fusulinids from Japan, we noticed that in the genus *Pseudodoliolina* of Japan there are represented two distinct forms, namely the group of *Pseudodoliolina ozawai* and that of *Pseudodoliolina pseudolepida gravitesta*. The two groups resemble each other in general morphology. However, the group of *Pseudodoliolina pseudolepida gravitesta* differs from the group of *Ps. ozawai* mainly in having the well differentiated layers even in early stage of ontogeny. Furthermore *Pseudodoliolina pseudolepida gravitesta* has larger form, more slender septa and narrower parachomata than the latter group. In addition to those morphological differences, the both groups differ from each other in biostratigraphic occurrences. Namely, *Pseudodoliolina pseudolepida gravitesta* is hitherto discovered only from the Upper Permian Kuma formation in Kyushu, the Doi group and the Haigyu group in Shikoku and the Maizuru group in Honshu, which are characterized by the advanced species of *Yabeina*, *Lepidolina*, etc. and are Late Permian (the zone of *Lepidolina*) in age. The group of *Pseudodoliolina ozawai* is, on the other hand, reported from the upper part of the Lower Permian to the Middle Permian of Akasaka, Akiyoshi, Atetsu, etc., in association with abundant individuals of *Parafusulina* and *Neoschwagerina*.

The above morphological and biostratigraphical consideration leads us to

* Received June 17, 1961; read at the 77th meeting of the Society at Nagoya, Nov. 19, 1960.

restrict the genus *Pseudodoliolina* to the group of *Pseudodoliolina ozawai* and to propose here a new generic name, *Metadoliolina* for the group of *Pseudodoliolina pseudolepida gravitesta.* This new genus includes some species hitherto assigned either to *Pseudodoliolina* or to *Misellina.*

Description

Family Fusulinidae MÖLLER, 1878

Subfamily Verbeeekininae STAFF et WEDEKIND, 1910

Genus *Metadoliolina* ISHII et NOGAMI, new genus

Type-species:—Pseudodoliolina pseudolepida gravitesta KANMERA, 1954, *Mem. Fac. Sci., Kyushu Univ., ser. D, Geol., vol. 4, no. 1,* p. 12, pl. 2, figs. 1-6. (*Pseudodoliolina pseudolepida gravitesta* is in this paper regarded as a distinct species, which is generically separated from *Pseudodoliolina pseudolepida;* see below).

Diagnosis:—Shell large, elongate ellipsoidal to subcylindrical; central portion slightly inflated to flattened; polar ends broadly rounded; proloculus small to moderate; shell expands slowly and uniformly; spirotheca not so thin, composed of tectum and lower less dense layer in inner three or four volutions, and of tectum, thick diaphanotheca, and thin upper and lower tectoria in outer volutions beyond them; in some parts of shell or in some specimens tectoria often absent, keriotheca present; septa comparatively slender, extended anteriorly at small angle from normal to spirotheca; parachomata numerous, narrow and small.

Comparison:—Metadoliolina resembles *Pseudodoliolina* YABE et HANZAWA, 1932 (type-species: *Pseudodoliolina ozawai* YABE et HANZAWA, 1932) in the shell form, and the mode of parachomata and septa. However, the two genera can be distinguished from each other as follows: 1) The spirotheca of *Metadoliolina* is distinctly differentiated, and except for inner two or three volutions it is composed of a tectum, a thick transparent layer (diaphanotheca) and thin upper and lower tectoria. Furthermore, they are often perforated by fine parallel dark line. This fine alveolar structure is similar to the alveoli of the genus *Verbeekina* (Pl. 25, fig. 4). On the other hand, the spirotheca of *Pseudodoliolina* is composed of an undifferentiated layer (a tectum and protheca) in almost all volutions. In the type-species it is very thin and a compact single layer (Pl. 25, fig. 6), and in some other species such as *Pseudodoliolina pseudo lepida* and *Ps.* sp. (Pl. 25, figs. 7, 8) from Atetsu of Japan, it is comparatively thicker than that of the type-species. In outermost volutions the spirotheca of those species is rarely differentiated into a transparent layer and fine porous layer (not keriotheca). 2) The differences of the two genera in other features are not so large as that in the spirotheca. In general *Metadoliolina* has a larger size of the shell, more slender septa and smaller parachomata than *Pseudodoliolina.*

Metadoliolina is allied to the genus *Verbeekina* in the spirothecal structure. The former can be, however, easily distinguished from the latter by the ellipsoidal and subcylindrical form, and more distinct parachomata even in the ontogenetically younger stages.

Metadoliolina can be distinguished from the genus *Misellina* (type-species: *Doliolina ovalis* DEPRAT, 1915) in size, shell form, foramina and parachomata.

Remarks:—The foreign species such as

Schwagerina lepida Schwager, 1883,* *S. lepida ellipsoidalis* Schwager, 1833, *Doliolina major* Deprat, 1914 and *D. douvillei* Gubler, 1935 may be also included within the genus *Metadoliolina*.

Schwagerina lepida Schwager was referred by Thompson (1948) tentatively to the genus *Misellina*, but he remarked at the same time that it might not be congeneric with the type-species, *Doliolina ovalis* Deprat. *Schwagerina lepida* has larger size, more numerous volutions, and narrower and more numerous parachomata than the type-species of *Misellina*. Furthermore, in the attitude of septa of the sagittal section *Schwagerina lepida* belongs to *Pseudodoliolina*-type, whereas *Misellina* belongs to *Cancellina*-type. In many shell features *Schwagerina lepida* resembles *Pseudodoliolina* rather than *Misellina*. In the presence of the keriothecal structure, however, *Schwagerina lepida* cannot be referred to *Pseudodoliolina*. In our opinion it should be included within *Metadoliolina*.

Doliolina major may be regarded as a synonym of *Schwagerina lepida*. *D. douvillei* which resembles the genus *Pseudodoliolina* in many shell characters, have clear keriothecal structure like *S. lepida*. Therefore it can be included within the genus *Metadoliolina*.

Distribution:—Middle ? and Upper Permian: Japan, China and Cambodia.

Metadoliolina gravitesta
(Kanmera), 1954

Plate 25, Figs. 1–4.

* *Schwagerina lepida* Schwager, 1883 is the type-species of *Doliolina* Schellwien, 1902, which is however preoccupied by *Doliolina* Borgert, 1894 (Schenck & Thompson, 1940). In order to avoid eventual misunderstanding it is here mentioned that *Misellina* is not a substitute name for *Doliolina* Schellwien, 1902.

1954. *Pseudodoliolina pseudolepida gravitesta* Kanmera, *Jour. Fac. Sci., Kyushu Univ., ser. D, Geol., vol. 4, no. 1*, pp. 12–14, pl. 2, figs. 1–6.

1954. *Pseudodoliolina* n. sp.?, Kanmera, *Ditto.*, pp. 14–15, pl. 2, figs. 7, 8.

1954. *Verbeekina* ? n. sp., Kanmera, *Ditto.*, pp. 15–16, pl. 2, fig. 9.

1960. *Pseudodoliolina pseudolepida gravitesta* Chisaka, *Jour. Coll. Arts. Sci., Chiba Univ., vol. 3, no. 2*, p. 246, pl. 4, figs. 1–6.

cfr. 1956. *Misellina* spp. a, b, Noda, *Rep. Earth Sci., Dept. Gener. Edu., Kyushu Univ., vol. 2*, pp. 12–13, pl. 1, figs. 11, 15b, 16, pl. 3, figs. 4, 5, pl. 4, figs. 1a, 1c.

Description:—The size and number of volution of mature specimens is difficult to decide precisely, because outer several volutions of most specimens are often crushed away. But mature specimens seem to have 20 volutions or more. Shell large, elongate ellipsoidal to subcylindrical, tightly coiled, with flattened or slightly inflated central portion and broadly rounded poles. Specimens of 20 volutions are 8.4–9.3 mm long and 4.2–6.1 mm wide; form ratio varies from 1.9 to 2.0.

Proloculus moderate to large, its outside diameter 135–320 microns. Shell expands slowly and uniformly.

Spirotheca not very thin. In inner two or three volutions it is comparatively thin and is composed of tectum and less dense layer. Beyond three or four volutions it is clearly composed of thin tectum, rather thick transparent layer (diaphanotheca) and very thin upper and lower tectoria. Keriothecal structure is seen in some volutions; in some specimens it is observed in all volutions. Thickness of spirotheca measures 5–10 microns in the 5th volution, 10–20 microns in the 10th, 15–30 microns in the 15th and 30–35 microns in the 20th.

Septa closely spaced, and nearly normal to the spirotheca. It is composed of a downward deflection of tectum and anterior and posterior downward extensions of diaphanotheca or keriotheca of spirotheca.

Parachomata narrow and, in ontogenetically adult stages, low. They are half or more as high as chambers in early stages, nearly half in middle stages and less than half in adult stages.

Foramina small, circular or elliptical in cross section.

Comparison:—*Metadoliolina gravitesta* was originally proposed as a subspecies of *Pseudodoliolina pseudolepida* (KANMERA, 1954). However, the former differs essentially from the latter by the appearance of the diaphanothecal or keriothecal structure even in the ontogenetical early stages.

This species can be distinguished from *Metadoliolina lepida* (SCHWAGER), including *M. lepida ellipsoidalis* and *M. major* (DEPRAT), in larger and longer shell, larger proloculus, thicker spirotheca, clearer diaphanotheca, smaller parachomata and smaller foramina.

Furthermore this species is easily distinguished from *Metadoliolina douvillei* (GUBLER) and *Misellina major* in CHEN (1956) [=*Metadoliolina douvillei*], which resemble *M. lepida* in shell characters, by the shell form, shell size and thickness of diaphanotheca.

Material:—Lectotype, Reg. no. Ku 499-97, a limestone lens (Loc. Ku 499) of the upper coarse of the small tributary towards the northern side of the Kawamata valley, Kawamata-mura, Yatsushiro-gun, Kumamoto Pref., Kyushu. Other specimens, PF 1400, a limestone lens, 300 m. north of the bridge at Haigyuguchi, Miyahama-mura, Naka-gun, Tokushima Pref., Shikoku; JPF-10505, a limestone lens, about 500 m, northwest of Nabae, Takahama-cho, Ooi-gun, Fukui Pref., Hokuriku. These specimens are stored in the Geological Institute, Kyushu University (Ku), in the Division of Geoscience, Osaka City University (PF), and in the Geological Institute, Kyoto University (JPF). Ku 499-97, collected by KANMERA, PF 1400, collected by SUYARI, JPF-10505 collected by NAKAZAWA.

Occurrence:—The lectotype and Ku 499-27 occur in the Kuma formation, Kyushu, PF 1400, in the Haigyu group, Shikoku and JPF-10505 in the Maizura group, Hokuriku. As known at present, occurrence of these specimens is confined to the Late Permian (the zone of *Lepidolina*).

Phylogeny of *Metadoliolina* and *Pseudodoliolina*

As mentioned already, *Metadoliolina* and *Pseudodoliolina* resemble each other in general shell characters excepting the spirotheca. However, the type-species of *Metadoliolina*, which is confined to the Late Permian, is larger in size and has lower and narrower parachomata than the type-species of *Pseudodoliolina*, i. e., *Pseudodoliolina ozawai* which is late Early Permian and Middle Permian in age (Pl. 25, fig. 5). The mode of parachomata and septa in the ontogenetically adult stages of *Pseudodoliolina ozawai* resembles to some extent that of *Metadoliolina*. Furthermore *Pseudodoliolina pseudolepida*, which is Middle Permian in age, is morphologically intermediate between them. The exact geological horizon of *Metadoliolina lepida* is unknown, but it may be Middle Permian in age rather than Upper Permian. *Metadoliolina lepida* resembles *Pseudodoliolina pseudolepida* in many shell features except for the juvenile stages and the spirothecal structure.

Among various morphological elements of fusulinids, the spirotheca makes the most remarkable change in the course of phylogeny. As remarked by ISHII (1959), following evolutionary stages of wall are recognizable in many phylogenetic series within the fusulinids; the undifferentiated layer or a single layer (*Eostaffella*-type wall) → parallel layer [tectum plus lower dense layer → tectum plus transparent layer (diaphanotheca), sometimes associated with secondary layer (tectoria)] → appearence of porous layer → development of alveolar layer (keriotheca). The wall of *Pseudodoliolina* indicates the stage of the undifferentiated layer or the primitive parallel layer, while that of *Metadoliolina* indicates that of advanced parallel layer or alveolar layer.

Thus, considering the mode of the development of morphological features such as size, parachomata and spirotheca and the geological occurrences of *Pseudodoliolina* and *Metadoliolina*, we conclude that *Metadoliolina* was derived from *Pseudodoliolina*.

Acknowledgements

We express our deep gratitude to Assist. Prof. K. KANMERA (Kyushu University) for the oppotunity of reexamining type-specimens of *Metadoliolina gravitesta*, and to Dr. K. SUYARI (Tokushima University) for his kind offering at our disposal of a rock-sample collected by himself. We wish to express our thanks also to Assist. Prof. K. ICHIKAWA (Osaka City University) for effective counsel and reading of the manuscript.

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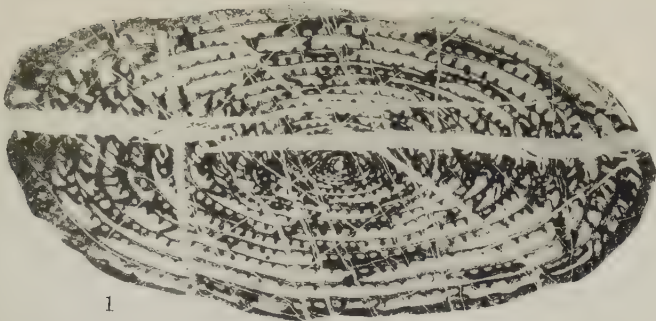
Explanation of Plate 25

Figs. 1–4. *Metadoliolina gravitesta* (KANMERA), 1954
1. Axial section, from the Haigyu group in Shikoku, deposited in Division Geosci., Osaka City Univ., Reg. no. PF 1400, × ca. 10.
2. Axial section of the lectotype (KANMERA, 1954, pl. 2, fig. 1), from the Kuma formation in Kyushu, deposited in Geol. Inst., Kyushu Univ., Reg. no. Ku 499–97, × ca. 10.
3. Slightly excentric sagittal section, from the Maizuru group in Hokuriku, deposited in Geol. & Miner. Inst., Univ. Kyoto, Reg. no. JPE–10505, × ca. 10.
4. Enlargement of fig. 2, showing the wall structure, × ca. 200.

Figs. 5, 6. *Pseudodoliolina ozawai* YABE et HANZAWA, 1932
5. Axial section of the topotype, occurred almost exclusively from the *Doliolina* horizon (OZAWA, 1927) of the Akasaka limestone, deposited in Division Geosci., Osaka City Univ., Reg. no. PF 1401, × ca. 10.
6. Enlargement of fig. 5, showing the wall structure, × ca. 200.

Fig. 7. *Pseudodoliolina pseudolepida* (DEPRAT), 1914
Axial section, occurred together with *Neoschwagerina cheni*, *N. margaritae* etc. from the *N. douvillei-N. margaritae* zone (NOGAMI, 1961) of the Atetsu limestone, deposited in Geol. & Miner. Inst., Univ. Kyoto, Reg. no. JPF–10321, × ca. 10.

Fig. 8. *Pseudodoliolina* sp. indet.
Axial section, occurred together with *Neoschwagerina douvillei, Pseudodoliolina pseudolepida* etc. from the *N. douvillei-N. margaritae* zone (NOGAMI, 1961) of the Atetsu limestone, deposited in Geol. & Miner. Inst., Univ. Kyoto, Reg. no. JPF–10327, × ca. 10.



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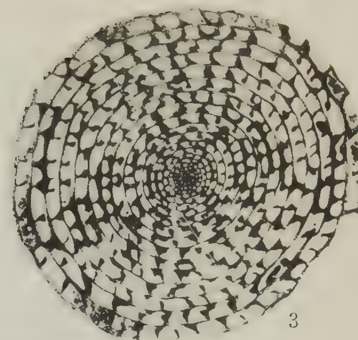

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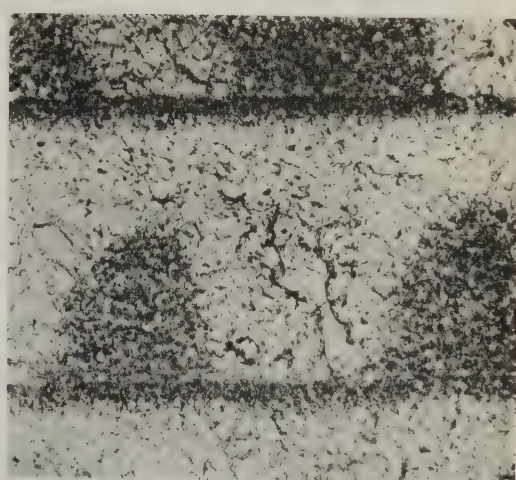

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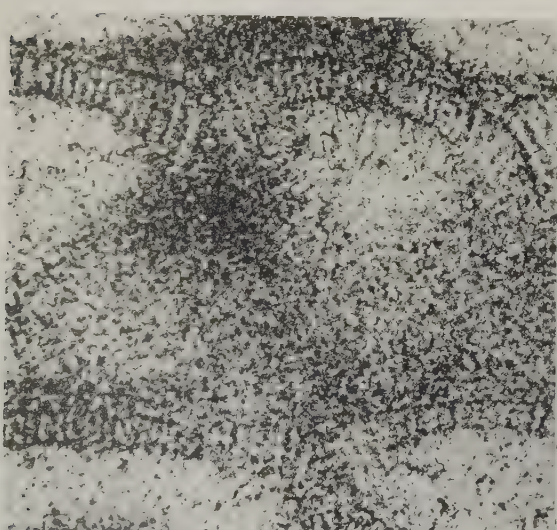

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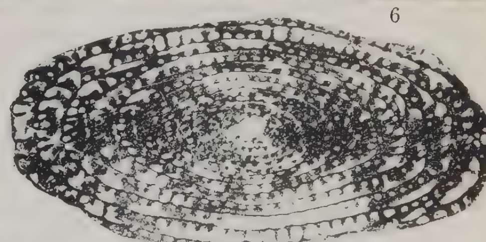

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ISHII and NOGAMI photo

Trans. Proc. Palaeont. Soc. Japan, N. S., No. 44, pp. 167-170, Dec. 15, 1961

419. *SPINILEBERIS*, A NEW GENUS OF OSTRACODA FROM THE PACIFIC*

TETSURO HANAI

Institute of Geology, University of Tokyo

新属 *Spinileberis* (Type species: *Cythere quadriaculeata* BRADY) を記載した。この新属は南太平洋より日本の黒潮地域にわたって沿岸水中に現生する。所属亜科は不明である。

花 井 哲 郎

It has been known since the time of the Challenger Report that a species called *Cythere quadriaculeata* is distributed widely over the Pacific area. In revising old generic identification of Japanese Ostracoda in light of the recent advancements of ostracod taxonomy, the writer found that the species has certain characters which do not permit its assignment to any known genera or subgenera. A new genus *Spinileberis* is, therefore, proposed for this peculiar form. However, the classificatory position of the new genus is at present uncertain.

Gratitudes are expressed to Professors Teiichi KOBAYASHI and Fuyuji TAKAI of the University of Tokyo and to Professor H. V. HOWE of Louisiana State University, Baton Rouge, Louisiana for their continued encouragement.

Subfamily uncertain

Genus *Spinileberis* HANAI, n. gen.

Type-species:—*Cythere quadriaculeata* BRADY, 1880.

Diagnosis:—Carapace subquadrate. Outer lip projects to make fringe along the anterior margin. Carapace has a median sulcus and four longitudinal ridges. Dorsal ridge of each valve projects so as to make a v-shaped trough along the hinge line. Caudal process does not develop, but one posterior radial pore canal is bifurcated. Marginal duplicature broad. Radial pore canals few, straight and regularly spaced. No vestibule. Hinge amphidont.

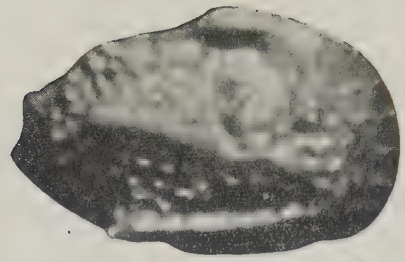
Remarks:—*Cythere quadriaculeata* BRADY has close resemblance in outline to genus *Neomonoceratina*. However, Amphidont dentition of this species does not permit to place this new genus to schizodont group of Ostracoda.

Spinileberis quadriaculeata (BRADY)

Text-figs. 1–7.

Cythere quadriaculeata BRADY, BRADY 1880, Challenger Rept., vol. 1, pp. 86, 87, pl. 22, figs. 2a–d, pl. 25, figs. 4a–d: CHAPMAN 1910, Jour. Linn. Soc., vol. 30, p. 432: CHAPMAN 1915, Zool. Res. Fishing Exp. F. I. S. Endeavour, vol. 3, p. 43: CHAPMAN 1916, Brit. Antarc. Exp., Geol., vol. 2, pt. 3, p. 73, pl. 6, fig. 47: CHAPMAN 1926, Proc. Rev. Soc. Victoria, vol. 38, (n. s.) pp. 127, 128: CHAPMAN, CRESPIN and KEBLE 1928, Rec. Geol. Surv. Victoria 5, no. 1, p. 170.

* Received July 12, 1961; read at 79th meeting of the Society at Kanazawa, Sept. 23, 1961.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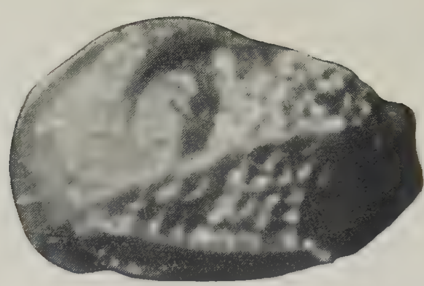
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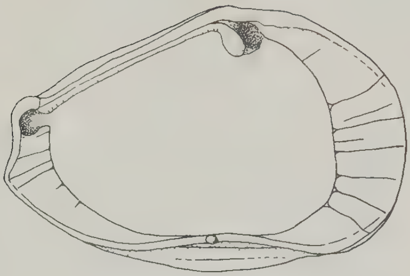
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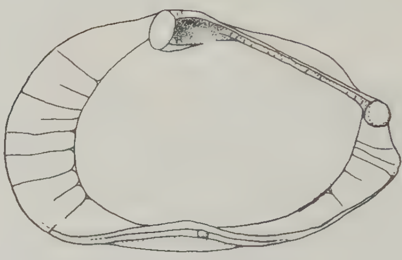
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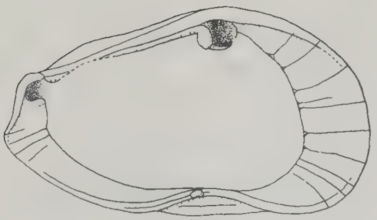
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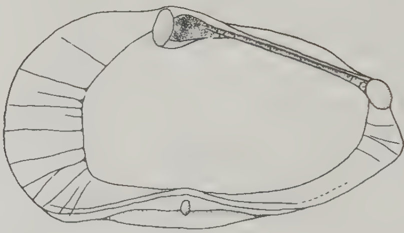
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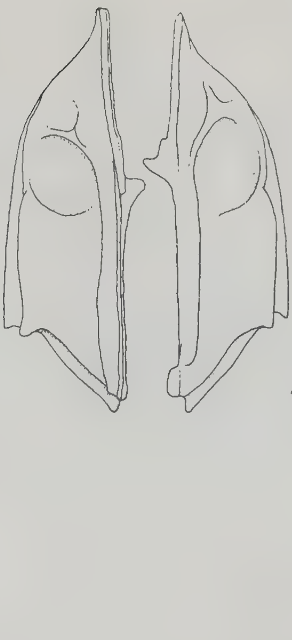
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Text-figures 1–7. *Spinileberis quadriaculeata* (BRADY)

1, lateral view of right valve (female).
2, lateral view of left valve (female).
3, internal view of left valve (female).
4, internal view of right valve (female).
5, internal view of left valve (male).
6, internal view of right valve (male).
7, dorsal view (female).

Cythereis quadriaculeata (BRADY); G. W. MÜLLER 1912, Das Tierreich 31, p. 357.

Figured specimens:—Geol. Inst., Tokyo Univ., CA 4995, a right valve, female, text-figs. 1, 4, 7; CA 4996, a left valve, female, text-figs. 2, 3, 7; CA 4997, a right valve, male, text-fig. 6; CA 4998, a left valve, male, text-fig. 5.

Description:—Carapace irregularly subquadrate in lateral outline. Anterior margin obliquely and broadly rounded. Outer lip projects to make fringe along the anterior margin. Dorsal contact margin nearly straight and steeply inclined posteriorly; obscured by the development of the dorsal ridge to make a lateral outline which is slightly convex and suddenly excavated in its posterior end. Ventral contact margin slightly concave obscured by the arched projection of bottom ridge in lateral outline. Posterior margin triangular nearly straight to slightly concaved in the upper half and slightly convexed in the lower half. Posterior cardinal angle distinct. Carapace compressed laterally in the anterior cardinal marginal area. Surface has a median sulcus and ornamented with longitudinal ridges. Dorsal ridge runs along the dorsal margin and sufficiently high enough to obscure the dorsal contact margin; the ridge curve at the anterior cardina angle, and reach the anterior part of the central ridge. Central ridge runs obliquely across the median sulcus and terminates posteriorly in a sharp spine. Bottom ridge runs close to and parallel with the ventral contact margin. Surface covered with a fairly coarse reticulation except in the anterior laterally compressed area. In dorsal view, carapace appears to be arrow-head shaped. Dorsal ridge of each valve projects so as to make a v-shaped trough along the hinge line. Ventral surface roughly flattened. Central and ventral ridges give angulation to make pentagonal appearance in anterior view.

Marginal duplicature broad. Radial pore canals simple, straight and few; about eight regularly spaced along the anterior margin. Pseudo-radial pore canals present. One posterior radial pore canal bifurcates. Hinge amphidont. Anterior and antero-median element is smooth; postero-median element is crenulated and posterior element is smooth. Snap pit and knob structure develop weakly. Adductor muscle scar pattern not observable.

Sexual dimorphism fairly strong; male more elongate than female forms.

Dimensions:—Figured specimens (CA 4995) a right valve, female, length 0.61 mm., height 0.37 mm., thickness 0.15 mm.; (CA 4996) a left valve, female, length 0.64 mm., height 0.41 mm., thickness 0.17 mm.; (CA 4997) a right valve, male, length 0.60 mm., height 0.34 mm., thickness 0.15 mm.; (CA 4998) a left valve, male, length 0.57 mm., height 0.33 mm., thickness 0.12 mm.

Occurrence:—The species was originally reported by BRADY (1880) from the Inland Sea of Japan (Setonaikai) and from off the reef at Honolulu, Hawaiian Is. CHAPMAN (1910, 1915, 1916, 1926) and CHAPMAN and CRESPIN (1928) reported this species from the Southern Pacific to the Antarctic Sea. Since the species from Japan seems to be a inhabitant of warm water mud, the distribution of this species in the cold water of the southern hemisphere may require further study. In Japan, this species is found living in the soft mud of the shallow warm (10°–27°C) coastal water at Aburatsubo Cove. Abundant fossil specimens are obtained from the lower horizon of the middle Pleistocene Sakurai silty

sand exposed along a cliff facing Tokyo Bay at Sakurai, Kisarazu-shi, Chiba Prefecture.

Remarks:—This species is quite similar to *Neomonoceratina microretibulate* in its outline and its ornamentations. This is probably due to convergence, because, in detailed shell structure, the carapace of this species is quite different from *Neomonoceratina*. The frill-like projection along the anterior margin of this species appears to be quite similar to those of *Neomonoceratina*. The frill of this new genus is, however, a modification of the outer lamella, whereas the frill of *Neomonoceratina* is a modification of the calcified marginal portion of the inner lamella.

Hingement of this genus is very close to that of *Neomonoceratina* in its appearance. However, the anterior and antero-median element is not split (i. e. not schizodont), and is identical with amphidont dentition. Posterior caudal process of this genus is not developed but one caudal radial pore canal of posterior extremity is always bifurcated. Marginal duplicature of the new genus is far broader than that of *Neomonoceratina*. However, the radial pore canals of both genera are few (about eight) in number; straight and regularly spaced in this new genus, but more or less tend to converge in the antero-ventral area in *Neomonoceratina*.

Although the hinge structure is not quite the same, the species described by KEY (1954) from Manila, Philippins, as *Paijenborchella* (*Neomonoceratina*) *koenigswaldi* KEY may perhaps be closely related to this new genus.

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Trans. Proc. Palaeont. Soc. Japan, N. S., No. 44, pp. 171-174, pl. 26, Dec. 15, 1961

420. ON A EQUID FOSSIL FROM HIRAMAKI FORMATION*

TOKIO SHIKAMA

Geological Institute, Yokohama National University, Yokohama

and

SHINJI YOSHIDA

Institute of Earth Sciences, Aichi Gakugei University, Nagoya

岐阜県可児市平牧の山崎における中新統・平牧層下部から産した馬の下顎を記載した。
鹿 間 時 夫・吉 田 新 二

In April, 1958, R. HIDA, a farmer in Hiramaki, Kani city, Gifu Prefecture found a lower jaw of *Anchitherium* on a valley wall of Ôhata in Hiramaki, and possessed it as a part of dragon remains. The junior writer, while making a field survey of this area, acquired this information and could borrow the specimen from HIDA for this study. From Ômori, 1 km southeast of this locality, two fragmental teeth of *Anchitherium* were found and described by H. MATSUMOTO in 1921. The specimen described here is of the same species as MATSUMOTO's and is in far better preservation. The formation of the neighbourhood of the locality consists of alternation of white tuffaceous sandstone and black siltstone and belongs to the uppermost part of Lower Hiramaki formation. MATSUMOTO described *Palaeotapirus yagii* MAT., *Chilotherium pugnator* (MAT.), *Amphitragulus minoensis* MAT., *Gomphotherium annectens* (MAT.), sciurid sp. besides this species. He correlated the fauna of Hiramaki formation with that of European Burdigalian or Gaj-Lower Siwalik of India. In 1949 F. TAKAI reported *Palaeotapirus yagii* and *Chilotherium pugnator* from Katabira, Kani city and regarded the age of Hiramaki fauna as middle to late Miocene. It may be significant that the species in question is very much like *A. gobiense* COLBERT from Tungur formation of Outer Mongolia. Considered from this point of view, the uppermost part of Lower Hiramaki formation may be treated as late Miocene in age.

Here the writers extend their hearty thanks to Prof. F. TAKAI, Dr. T. HANAI, Mr. Y. HASEGAWA for their valuable advice and help during the course of this research and to Mr. R. HIDA for his kindness to permit them to use this specimen for their study.

Anchitherium hypohippoides
MATSUMOTO, 1921

Pl. 26, figs. 1-9

* Received July 14, 1961; read at 77th Meeting of the Society at Nagoya, Nov. 19, 1960.

1921. MATSUMOTO, *Sci. Rep. Tôhoku Imp. Univ., ser. 2, vol. 5, no, 3*, pp. 77–78, pl. 13, figs. 1–5.

Specimens:—Right and left rami of a same individual, collected and possessed by R. HIDA; gypsum model stored in Geological Institute, Yokohama National University.

Locality:—Ôhata, Yamazaki, Hiramaki, Kani city, Gihu Prefecture.

Horizon:—Uppermost part of Lower Hiramaki formation; late Miocene.

Description:—Right and left horizontal rami preserved in the same block of greyish white hard tuffaceous sandstone, the former retaining five cheek teeth from P_2 to M_2 and the latter five cheek teeth of P_2, P_3, M_1, M_2 and M_3; teeth thick black in colour and bone dark brown to black; left ramus broken at hind of P_3, detaching P_4 which is not preserved; tip of rostrum with I and C not preserved. Ramus in poor preservation, surface of which a little deformed by crushing; ramus straight and not high, lower border gradually ascending forwardly.

Cheek teeth moderately worn, and brachyodont, with thick enamel wall and well developed basal cingulum. Ground surface eminently W-shaped. P_2 much longer than wide, elongate trigonal in upper view, becomes broader posteriorly and anterior lobe smaller than posterior lobe; in outer view, anterior lobe longer than posterior, subquadrate in general outline, with obsolete basal cingulum, straight anterior margin vertical to alveolar border and with posterior margin bent backward; posterior lobe longer in upper margin than in lower margin and with eminent basal cingulum. In inner view, paraconid and metaconid bent backward, while hypoconulid bent forward; they tip upward and upper portion bluntly projected; metastylid obsolete; posterior valley larger than anterior. In upper view, posterior lobe more strongly curved than anterior; hind margin gently curved; paraconid and hypoconulid distinct while metaconid weak in development.

P_3 subquadrate in upper view, longer than wide, and a little broader posteriorly; posterior lobe and valley larger than anterior. In outer view, anterior lobe a little higher than posterior and slightly bent backward, while posterior lobe almost vertical to alveole; basal cingulum well developed on both lobes and carries many small tubercles; outer wall of posterior lobe broken at left P_3. In inner view, paraconid and metaconid bent backward while hypoconulid vertical to alveole; metastylid weaker than metaconid in development; paraconid small, lowest, about half the height of metaconid; hypoconulid eminent and bluntly projected upward. Protoconid and hypoconid strongly projected buccally but the former sharper than the latter. Ground surface of hypoconulid tolerably large and nearly quadrate.

P_4 largest and broadest of all teeth, quadrate in upper view, with wide worn surface which is more distinct in anterior lobe than in posterior; anterio-outer wall runs nearly straightly in anterior lobe, while gently curved in posterior lobe; posterior margin crenulated at inner side; posterior valley larger than anterior. General aspect of outer side is like that of P_3, but anterior lobe almost as high as posterior; basal cingulum thickest of all teeth and longer in anterior lobe than in posterior. General aspect of inner side is also like that of P_3; surface of enamel wall rugose; paraconid small, low and about half the height of metaconid which is large, eminent and higher than hypo-

conulid; metastylid and metaconid not well separated from each other; hypoconulid bluntly projected upward.

M_1 corresponds to P_3 in size and general aspect and in development of basal cingulum on outer wall, but contrary to P_3, anterior lobe a little broader than posterior. In upper view, posterior lobe more sharply projected outward than anterior; anterio-outer wall of posterior lobe runs straight while that of anterior gently curved; ground surface of anterior valley larger than anterior; posterior margin also crenulated at inner side. In outer view, basal cingulum longer in anterior lobe than in posterior; anterior lobe as high as posterior. General aspect of inner side is like P_4 and surface of enamel wall rugose; metaconid higher than hypoconulid. Anterior half of inner enamel wall broken at left M_1. Ground surface of hypoconulid quadrate and as long as wide. Metaconid and metastylid not clearly separated.

M_2 smaller than M_1, quadrate, broader anteriorly than posteriorly and posterior enamel wall of anterior lobe straight and wider than that of posterior lobe; anterior lobe more sharply projected than posterior; anterior valley as wide and long as posterior. In outer view, both lobes bent backward and posterior lobe higher than anterior; basal cingulum obsolete at posterior lobe. In inner view, general construction is like that of M_1 and metaconid higher than hypoconulid. Metaconid and metastylid very faintly separated from each other.

M_3 narrow, longest of all cheek teeth, elongate trigonal in upper view and with small talonid; anterio-outer portion ground; anterior valley larger than posterior; inner wall of hypoconid gently sloped inward with sharp line or valley bottom. In outer view, anterior lobe a little longer than and as high as posterior lobe; talonid blunt, carrying two small accessory tubercles at its anterior basal portion; basal cingulum obsolete. In inner view, general aspect of conids except talonid is like that of M_2; metaconid and metastylid undivided; talonid with median depression which is moderate in depth and outer wall largest; surface of enamel wall rugose at metaconid.

Measurements:—

United length of right P_2–P_4 ....53.0 mm
Ditto of left M_1–M_3 ....65.0

	P_2		P_3		P_4
	Right	Left	Right	Left	Right
Length at ground surface	20.3	20.2	21.0	20.0	21.2
Width at anterior lobe	10.8	10.7	15.0	15.2	16.3
Ditto at anterior lobe	13.8	13.9	15.7	——	16.1
Height of crown at outer side (posterior lobe)	9.2	10.2	10.5	——	10.0
Ditto at inner side (metaconid)	6.8	6.7	8.3	6.7	9.7

M_1		M_2		M_3	Holotype
Right	Left	Right	Left	Left	Left P_4
20.6	21.0	19.7	19.2	23.5	20.0 mm.
15.0	——	14.0	13.8	12.4	14.0
14.1	14.0	12.3	12.0	10.0	15.0
9.0	9.8	10.8	10.8	10.7	14.0
9.0	——	9.9	9.7+	11.0	——

Remarks:—According to MATSUMOTO's study, the holotype consists of left P_4 (?) and right P^3 and the former is an unworn tooth which is higher and smaller than this specimen. He says that this species is distinguished from *A. aurelianense* CUV. of the Burdigalian-Vindovonian in Europe by higher basal cingulum and from *A. ezquerre* V. MEYER of the Vindovonian-Sarmatian of Spain by its smaller size. Further, the writer thinks that this species is distinct from *ezquerre* in having relatively longer and lower P_4 with more obsoletely separated metaconid and metastylid. When COLBERT described *Anchitherium gobiense* COLBERT from Tung Gur formation of Outer Mongolia (Mio-Pliocene), he reserved a comparison with this species because it is very incomplete in materials, but he regarded that both are quite near to each other. *A. gobiense* is a little larger and has less developed basal cingulum than this species, although both species are quite like each other. He regarded *Paranchitherium karpinskii* BORISSIAK from Caucasus as belonged to *Parahippus*. *Hypohippus zitteli* (SCHLOSSER) from the Pontian red clay of China is a more advanced form with less developed basal cingulum of teeth and much larger than this species.

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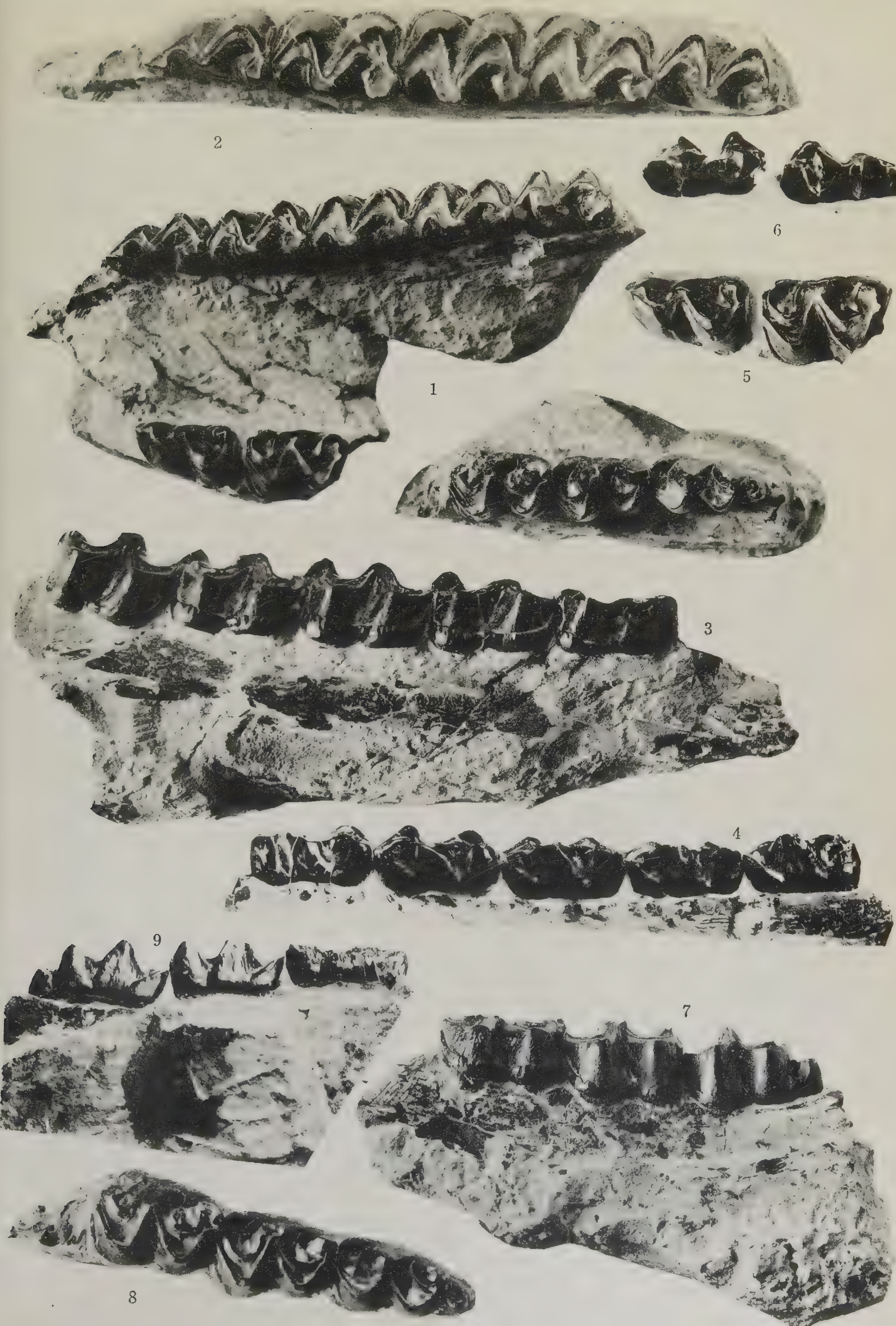
Explanation of Plate 26

Anchitherium hypohippoides MATSUMOTO

Fig. 1. Upper side of the specimen, ×0.75
Fig. 2. Ditto of right teeth, ×1.05
Fig. 3. Outerside of ditto, ×1.05
Fig. 4. Innerside of ditto, ×1.05
Fig. 5. Upperside of left P_2, P_3, ×1.05
Fig. 6. Innerside of ditto, ×1
Fig. 7. Outerside of left M_2–M_3, ×1.04
Fig. 8. Upperside of ditto, ×1.04
Fig. 9. Innerside of ditto, ×1



HASEGAWA photo

southeastern Asia. Terrigenous facies is developed on the continent but calcareous and siliceous rocks are common in the archipelago. In the Malay peninsula marine Triassic beds have been reported as follows:

(1) NEWTON (1900) described *Chlamys valoniensis, Pleurophorus elongatus* (?), *Pteria pahangensis, Mytilus* cfr. *minutus, Gervillia inflata, Pteroperna malayensis, Myophoria malayensis, M. ornata, M. inaequicostata, M.* sp. and *Actinodesma bellamyi* from Lipis district. Comparing this fauna to the Napeng one (HEALEY, 1908), he considered it Upper Triassic or Rhaetic. On account of the prevalence of *Myophoria* he proposed "*Myophoria*-sandstone" for the bed.

(2) NEWTON (1923) reported 17 lamellibranchs including *Myophoria ornata, M. bittneri* and *Chlamys* cfr. *valoniensis* from Shingapore and considered them also Upper Triassic.

(3) Later (1925) he described *Halobia malayensis, H. moussoni* and a halobiid beside an indeterminable ammonite from Kedah and Perak provinces. The *Halobia*-shale is lower than the *Myophoria*-sandstone and probably Middle Triassic.

(4) WEIR (1925) reported another occurrence of the *Myophoria*-bed or the *Myophoria*-sandstone in Pahang province.

(5) SCRIVENOR (1931) added 2 other occurrences of *Myophoria*-sandstcne in Pahang beside an occurrence of *Daonella*-like shell in a shale of Kalantan.

(6) Geologists of the Geological Survey of Malaya made a collection of myophoriids and other pelecypods from two localities near Kuala Lipis, which were sent to Dr. Cox of the British Museum. He compared the faunule to those of the *Myophoria*-sandstone.*

(7) Recently pelecypods were discovered from the head waters of the river Ulu Sungei Kenong. According to ALEXANDER** they are known from two localities. Dr. COX who examined a collection recognized 14 pelecypods including "*Gervillia*", pterioids, *Mysidioptera, Myophoria* and others and considered the faunule to be Upper Triassic. Another collection was made at a small stream on the eastern bank of Ulu Sungei, Kenong, 2.5 miles SSW of the above locality. The materials are submitted to Prof. KOBAYASHI. They are now described.

(8) KUMMEL (1960) described 4 ammonites (*Paraceratities trinodosus, Sturia sansovinii, Acrochoriceras* sp. and *Ptycites* sp.) from a branch of the river Sungei, near Kuala Lipis. The age is determined at Anisic.

In summary, several Triassic fossil beds in Malaya are presumably in the succession as follows:

1. (Upper) *Myophoria*-sandstone by NEWTON at several localities in Pahang and Singapore ....Upper Triassic
2. *Pteria* sandstone by COX (MS) in Pahang....................Upper Triassic
3. *Halobia moussoni* shale in Pahang by NEWTON ....Middle or Upper Triassic
4. *Daonella* shale in Kalantan by SCRIVENOR....................Middle Triassic
5. Lower *Myophoria* sandstone in Pahang ....Middle Triassic
6. Ammonite bed in Pahang by KUMMEL ....Middle Triassic

Lower *Myophoria* sandstone

The lower *Myophoria* sandstone includes *Neoschizodus laevigatus elongatus* and *Myophoria goldfussi lipisensis*, new

* Personal communication from Mr. Harold SERVICE to Prof. KOBAYASHI. (GS 53/Q/083/15).

** Dr. ALEXANDER sent information and manuscript by Dr. COX for reference (GS 60/F/026/10).

subspecies. These two forms represent a lower horizon than NEWTON's *Myophoria* sandstone which yields *M. inaequicostata* and allies such as *M. malayensis*, *M. harpa* and *M. bittneri*. The *elongatus-lipisensis* association is allied to the Middle Triassic fauna of Yunnan, where LÓCZY (1898) described *M. radiata*, *M. szechenyii* and *N.* cfr. *laevigatus*, and MANSUY (1912) reported *N. laevigatus* and *M.* "*radiata*" (=*M. goldfussi lipisensis*, new subspecies, which is distinguished from *M. radiata* s. s.). *N. elongatus* is allied to the one described from the Dolomiten by OGILVIE-GORDON (1927). The elongated *laevigatus* with an acute carina is known in the Ladinic of south Israel (LERMAN, 1960) and Trans-Jordan (COX, 1924, 32). They are distinguishable from the so-called *laevigatus* in the Upper Triassic of Tonkin and Japan by the outline and carination. *Lipisensis* belongs to the group of *goldfussi*. It is different from *inaequicostata* in the number and mode of ribbing. Because it is known that the former flourished a little earlier than the latter, the *lipisensis-elongatus* horizon is probably older than those of *inaequicostata* and *malayensis*. It means that there are at least two *Myophoria* beds in the Triassic of Malaya. Therefore "lower *Myophoria* sandstone" is proposed here for the sandstone containing *lipisensis* and *elongatus*.

According to Foo Yew HONG* the bed is about 2 ft thick, steeply dips southwest (220°/60°) and crops out at a small stream on the eastern bank of Ulu Sungei Kenong in Yong Forest Reserve, Lipis District.

The sandstone is dark grey, but when weathered, it changes to white or yellowish brown. It contains sometimes large, smooth and rounded nodules of argillaceous matrix. The sandy grains consist of rounded quartz and chert, but almost devoid of feldspars. The matrix is somewhat cherty. It is interesting to see that *laevigatus* is somewhat orientated in a certain direction. The fact suggests currents of water when the sandstone was accumulated. In Japan *Myophoria* facies is more off-shore than the "trigonian" facies, because the *Myophoria* sandstone is more currented than the *Minetrigonia*-sandstone. It is supported by the fact that the *Minetrigonia*-sandstone is found often in the paralic Mine facies, but *Minetrigonia* is uncomcom in the neritic Kochigatani facies (TOKUYAMA, 1961). *Myophoria* is, on the other hand, absent in the Mine but common in the Kochigatani series. The *Myophoria* sandstone in Malaya is probably also neritic rather than littoral or paralic, because the sandgrains are composed of well-rounded quarz and chert and shells are controlled by oceanic currents in the thanato-history of the fossils.

The sandstone along the Ulu Sungei is strongly deformed and somewhat crushed (so-called B-Tektonite by METZ, 1957). Fossils preserved in the sandstone are strongly compressed.

The lower *Myophoria* sandstone yields the following species.

a) Ulu-Sungei collection
  - *Myophoria goldfussi lipisensis*, new subspecies.
  - *Myophoria* sp. ex gr. *costata* ZENKER
  - *Neoschizodus laevigatus elongatus* (PHILIPPI)
  - *Hoernesia* (?) sp. indet.

b) Collection from a point between Benta and Kuala Lipis
  - *Pteria* sp. indet.
  - "*Plagiostoma*" (?) sp. indet.
  - *Myophoria goldfussi lipisensis*

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* Personal communication from Dr. ALEXANDER to Prof. KOBAYASHI.

Neoschizodus laevigatus elongatus
Anodontophora cfr. *trapezoidalis* MANSUY

Description of Fossils

Genus *Neoschizodus* GIEBEL

Neoschizodus laevigatus elongatus PHILIPPI

Plate 27, figures 1–6

1898. *Myophoria laevigata* var. *elongata* PHILIPPI, p. 165, pl. 6, fig. 4 (in Schmidt, 1928, p. 185, fig. 425).
1927. *Myophoria laevigato* var. *elongata*, OGILVIE-GOLDON, p. 33, pl. 3, fig. 3a, b.

Description:—Shell medium in size, subquadrate in outline, longer than high; anterior and ventral margins evenly rounded; posterior margin somewhat alated. Umbo prominent, subangulate and a little incurved. Carina sharp and persistent. Posterior area flat and devoid of a median depression. Disc smooth, covered with concentric growth lines; a sinus weak and broad if present, on its posterior part.

Observations:—Specimens are preserved in phyllitic sandstone and so strongly deformed that it is hard to restore the original form. It is however a remarkable fact that most specimens are compressed dorso-ventrally, and more less elongated antero-posteriorly. This suggests that the shells have been orientated nearly in the same direction before they were compressed. If so, the orientation may be related to bottom current, in view of the fact that myophoriid shells are sometimes similarly orientated in the Röt of Muschelkalk in Germany (v. FREYBERG, 1932).

Comparison:—*Neoschizodus laevigatus* is a well-known and widespread species. In the German Trias it ranges from the Röt to the upper Muschelkalk and its age is nearly same in the Indo-Pacific region. Its variation in outline is fairly wide. It is however a general tendency of the species that the carina, which is strong in the Lower Triassic forms, becomes weaker in the later stages. Consequently the outline becomes higher and more rounded. In the Lower Triassic form from Balatonsee (FRECH, 1904) the carina is sharp and distinct and the posterior sinuation of the disc weak as in Malayan form; FRECH's *laevigatus* has a relatively higher outline than the Malayan form. The lower Ladinic *laevigatus* from Trans-Jordan (COX, 1932) and southern Israel (LERMAN, 1960) resemble this form in the more or less elongated outline and alated posterior margin, although the carina is weaker than this. Anisic *laevigatus* var. *elongatus* by PHILIPPI (1898, in SCHMIDT, 1928) represents an elongated form carrying a more or less sharp carina. It is, however, not alated postero-dorsally as in the Malayan form. *Laevigatus elongatus* from the Dolomitic series of southern Tirol (lower Muschelkalk) by OGILVIE-GORDON (1927) is the closest ally to the Malayan form. According to her "*elongatus*" bears a more or less sharp carina and an acute posterior angle, and elongated *laevigatus* with rounded posterior angle is thought to be an elongated variation of *ovatus*. Similar *laevigatus* is also reported from Yunnan (LÓCZY, 1998).

Finally, *laevigatus* is reported from the Upper Triassic of Tonkin (PATTE, 1926), Yunnan (MANSUY, 1912) and Japan (KOBAYASHI & ICHIKAWA, 1949, from the Kochigatani series; KAMBE, 1951, 57 from Shidaka series) beside Middle Triassic of Japan (NAKAZAWA, 1960). Except for the Lower and Middle Triassic forms they are all rounded and belong to the high form of the *ovatus*-group.

Occurrence:—Common in the argillaceous sandstone at Ulu-Sungei Kenon, Yong forest reserve, Lipis District, Pahang and rare at a point from the 3rd milestone on the road between Kuala Lipis and Benta, Pahang (no. 14820a).

Genus *Myophoria* BRONN

Myophoria goldfussi lipisensis, new subspecies

Plate 27, figures 7, 8, 11–20

1912. *Myophoria radiata*, MANSUY, p. 121, pl. 22, fig. 2a–f.

Description:—Shell small, about 10–13 mm long and subtriangular; umbo stout and prominent; carina strong and acute. Disc covered with 6–8 primary costae, which are weak, slender and narrowly spaced in anterior part, but strong and widely spaced in posterior; the most posterior one so stout that the posterior margin of disc becomes somewhat sinuated. 1–2 secondary costae inserted in posterior 1 or 2 interspaces. Area divided into 3 crescentic parts by a fairly distinct rib and furrow.

Observations:—Shells from Ulu Sungei, Kenong are strongly compressed as the preceding, but those from Loc. No. 14836, between Benta and Jerantut show original outlines (figs. 8, 18). As noted above, shells of *laevigatus* seem to be orientated in a direction at the locality, but it is not the case of this occurrence, because the shells are deformed in various ways (figs. 12–16).

Juvenile forms (figs. 19, 20) have 2 primary ribs beside 3 secondry ribs, inserted in their interspaces. Ribs increase their number by insertion, instead of branching. Therefore the shell grows through the *kefersteini*-like stage.

Comparison:—It is identical to *M. radiata* by MANSUY (1912, p. 121, pl. 22, figs. 2a-f), but somewhat different from *radiata* s. s. LÓCZY (1898, p. 155, pl. 9, figs. 21, 22). *Radiata* is characterized by the smooth and flat area and sharply edged carina, but MANSUY's bears a distinctly costate area, and somewhat alated outline.

Myophoria with a ribbed area is represented by *goldfussi*, which possesses more numerous ribs on the disc and area than this. HOHENSTEIN's *goldfussi* from the middle Muschelkalk of east Schwarzwald bears 11–13 primary ribs but the ribs are commonly countable 15–25 in *goldfussi*. *M. inequicostata* is allied to this in the number and mode of ribbing, but *inequicostata* is distinguished from this in having somewhat imbricated concentric growth-lamellae, which are absent in this. *M. malayensis* and allies by NEWTON (1900) belong to the group of *inequicostata*. Finally, this is a varietal form from *goldfussi* rather than an *inequicostata*.

Occurrence:—Abundant at the two localities of Lipis district.

Myophoria sp. ex gr. *costata* ZENKER

Plate 27, figures 9, 10

Two small specimens are distinguished from the preceding by their rounded outline and flattened area. It is not so inequicostate as the preceding. It belongs to the group of either *costata* or *radiata* rather than the *goldfussi-inequicostata* group, although ribs are fewer in this than in *costata*.

Occurrence:—Rare at the two localities in Lipis district.

Genus *Pteria* SCOPOLI

Pteria sp. indet.

Plate 27, figure 23

A small left internal mould is trape-

zoidal, alated posteriorly; hinge line long and straight; umbo large and anteriorly inclined; ventral margin somewhat quadrate. In outline and hinge it agrees with non-ribbed *Pteria* common in the Alpine Triassic such as *P. hofmanni* BITTNER (1901), although the umbo is large and not so elongated posteriorly in this as in *hofmanni*. Because the specimen is juvenile, the umbo is relatively large.

Occurrence:—Rare at loc. 14820 between Benta and Lipis.

Genus *Plagisotoma* SOWERBY

Plagiostoma (?) sp. indet.

Plate 27, figure 21

A small internal mould of a left valve and a few fragmentary external moulds are preserved in mudstone. They are suboval, 1.5 times longer than high and roundly inflated; beak fairly large and rounded; anterior auricle narrow, elongated trigonal, and fairly distinct; posterior one small, less distinct than anterior one. Shell ornamented with fine radial ribs or striae.

As commonly met with among Triassic forms, this bears a fairly large anterior auricle. The auricle agrees with those of common limids or *Limatula* (TOKUYAMA, 1960), but the ornament is allied to those of *Plagiostoma*. *Plagiostoma* is considered to be derived from the Middle Triassic branch of *Mysidioptera*, which the latter has no such auricle as this. The auricle suggests its being a derivative from *Limatula* or *Palaeolima*, but in the ornaments this form disagrees with these genera.

Occurrence:—Rare at Loc. 14836 near Benta.

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Explanation of Plate 27

Figs. 1–6. *Neoschizodus laevigatus elongatus* (PHILIPPI) 178
1–4: Internal moulds; loc.: Along a small branch of Ulu Sungei, Kenong. ×1. 5: Internal mould of a right valve, from loc. 14820 3rd milestone on the road between Kuala Lipis and Benta, Pahang. 6: External clay cast of a left valve, from Ulu Sungei, Kenong.

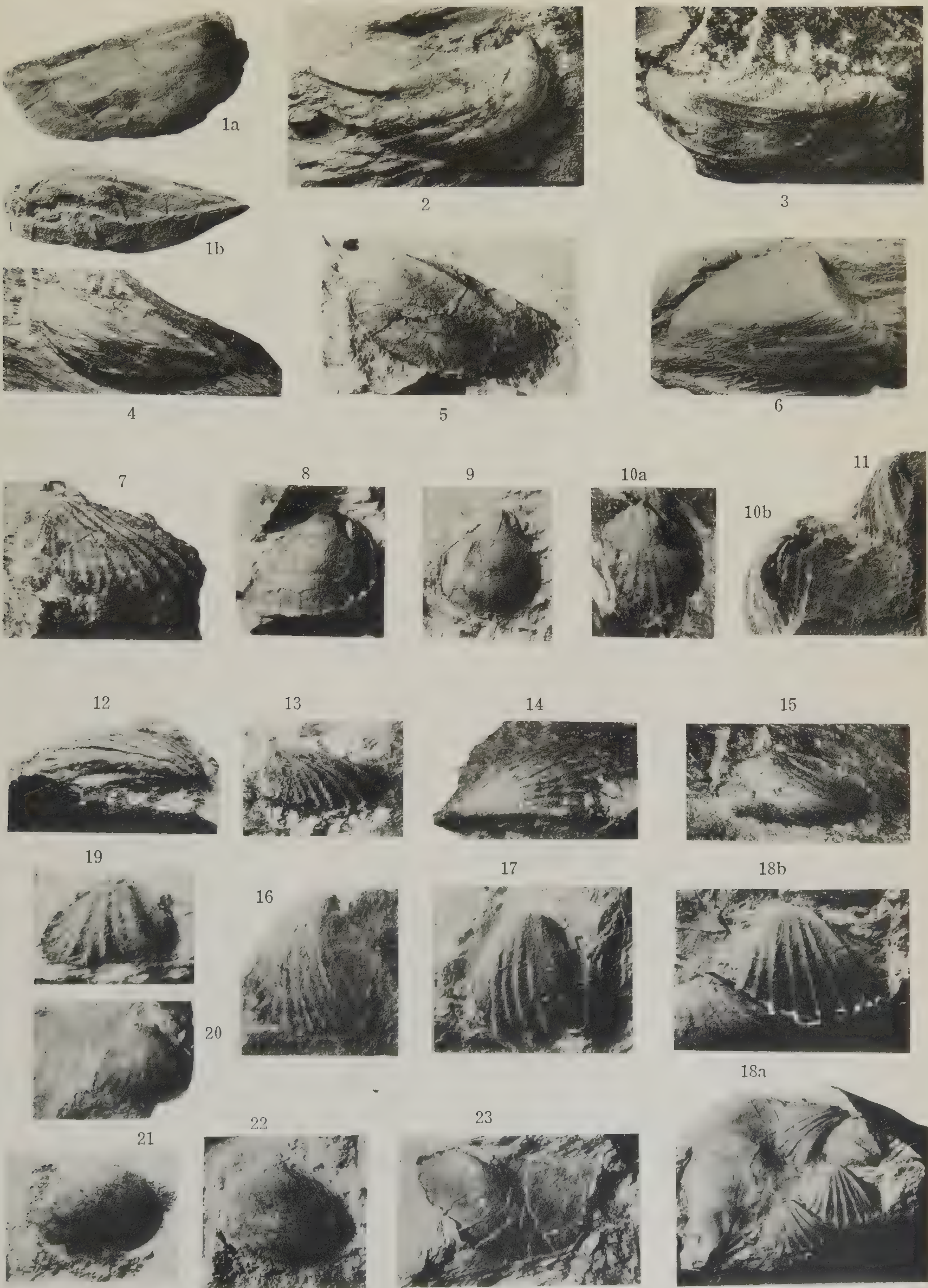
Figs. 7, 8, 11 20. *Myophoria goldfussi lipisensis* nov. 179
fig. 12: holotype, left valve; 8: left internal mould showing interior. 12–17: show various deformed shells. 8, 18: from loc. 14820a, others from Ulu Sungai. ×1.5 (19: ×3, 18a: ×1).

Figs. 9, 10. *Myophoria* sp. ex gr. *costata* ZENKER 179
9: right internal mould, loc. 14836 at the 33 1/2 milestone on the road from Benta to Jerantut. 10: left valve from Ulu Sungei, ×2.

Fig. 21. *Plagiostoma* (?) sp. indet. 180
Left internal mould from loc. 14820, ×1.5.

Fig. 22. *Anodontophora* cfr. *trapezoidalis* MANSUY 178
Left internal mould, from loc. 14836, ×1.5.

Fig. 23. *Pteria* sp. indet. 179
Left internal mould, from loc. 14820a, ×1.5.


1a
2
3
1b
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5
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8
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10a
10b
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18b
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九州における中央構造線 ....矢部長克

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Fossils from the Shôzugahama formation .... Tsugio Shuto

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石炭の花粉学研究における諸問題 ......徳永重元

shall call a Special Meeting at the written request of more than one-third of the members. The request shall be granted only if the written statement fully explains the reasons for assembly and items for discussion.

Article 19. Members unable to attend the General Meeting may give an attending member a written statement signed by himself trusting the bearer with the decision of business matters. Only one attending member may represent one absentee.

Article 20. The decision of the General Meeting shall be by majority vote. When the number of votes is equal, the President shall cast the deciding vote.

Article 21. The President and Councillors shall compose the Council. The dicision of the General Meeting concerning administration shall be considered and implemented by the Council.

Article 22. The Executive Council shall carry out the decisions of the Council.

Article 23. The fiscal year of the Society shall begin on the first of January each year and end on the thirtyfirst of December of the same year.

Article 24. The amendments to the Constitution of the Society shall be decided at the General Meeting and must be approved by more than two-thirds of those members who are in attendance.

Addendum 1) Voting in the Council shall be by unsigned ballot. (1961, Jan. 15)

例　会　通　知

	開 催 地	開 催 日	講演申込締切日
1961 年総会年会	東 北 大 学	1962 年 1 月 20 日	1961 年 12 月 10 日
第 81 回 例 会	熊 本 大 学	1962 年 6 月 2 日	1961 年 5 月 5 日

学　会　記　事

◎ 朝日賞に会員遠藤隆次君の研究「日本産中一古生代化石石灰藻の研究」を推薦することとした。

News

◎ 明年 6 月 2 日（土）に熊本大学で開催される、古生物学会例会には Marine Ecology に関するシンポジウムが予定されている。

会　員　消　息

◎ 会員高井冬二君は西アジア洪積世遺跡調査の後、ヨーロッパ諸国を視察して 11 月上旬帰国した。

◎ 会員中沢圭二君はチモール島の地質調査を終え 11 月上旬帰国した。

購読御希望の方は本会宛御申込下さい

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CONSTITUTION
of the
PALAEONTOLOGICAL SOCIETY OF JAPAN

Article 1. The Society shall be known as the Palaeontological Society of Japan.

Article 2. The object of the Society is to promote the study and popularization of palaeontology and related sciences.

Article 3. The Society, to execute Article 2, shall undertake the following business:
1. Issue the Society journal and other publications.
2. Hold or sponsor scientific lectures and meetings.
3. Popularize the science by field trips, scientific lectures and other projects.
4. Aid and encourage research work; award outstanding contributions to the Society; carry out the objectives stated in Article 2.

Article 4. To attain the object of the Society, the Society may, by decision of the General Meeting, establish within it research committees.

Article 5. The Society shall be composed of members who are active or interested in palaeontology or related sciences.

Article 6. The members shall be known as Regular Members, Fellows, Patrons and Honorary Members.

Article 7. Persons desiring membership in the Society are requested to fill out the necessary application forms and receive the approval of the Council.

Article 8. Fellows are persons who have held Regular Membership in the Society for more than ten years, have contributed to the science of palaeontology, have been nominated by five Fellows and approved by the Council.

Article 9. Patrons are organizations supporting Article 2 and recommended by the Council.

Article 10. Honorary Members are persons of distinguished achievement in palaeontology. They shall be recommended by the Council and approved by the General Meeting.

Article 11. The members of the Society shall be obliged to pay the annual dues stated in Article 12. Members shall enjoy the privilege of receiving the Society journal and participating in the activities stated under Article 3.

Article 12. The rates for annual dues shall be decided by the General Meeting. Rates for annual dues are: Regular Members, Yen 600; Fellows, Yen 1,000; and Foreign Members, $ 3.00, for which they will receive special publications in addition to the Society journal; Patrons are organizations donating more than Yen 10,000 annually; Honorary Members are free from obligations.

Article 13. The budget of the Society shall be from membership dues, donations and bestowals.

Article 14. The Society, by decision of the Council, may expel from membership persons who have failed to pay the annual dues or those who have disgraced the Society.

Article 15. The officers of the Society shall be composed of one President and fifteen Councillors, among whom several shall be Executive Councillors. The term of office is two years and they may be eligible for re-election without limitation. The President may appoint several persons who shall be Secretaries and Assistant Secretaries. An Executive Council shall be nominated and approved by the Council. Councillors shall be elected from Fellows by vote of returned mail unsigned ballot.

Article 16. The President shall be a Fellow nominated and approved by the Council. The President shall represent the Society and supervise the business affairs. The President may appoint a Vice-President when he is unable to perform his duties.

Article 17. The Society may have the honorary president. The honorary President shall be recommended by the council and approved by the General Meeting. The honorary president may participate in the Council.

Article 18. The Society shall hold regularly one General Meeting a year. The President shall be Chairman and preside over the administrative affairs. The program for the General Meeting shall be decided by the Council. The President may call a special meeting when he deems it necessary. The General Meeting requires the attendance of more than one-tenth of the members. The President